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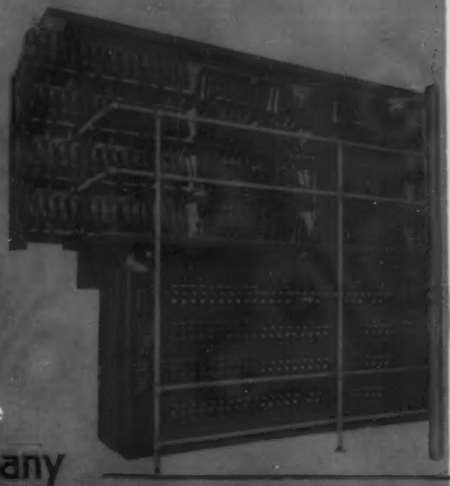

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Journal of Electricity and Western Industry

A semi-monthly chronicle of western events, advocating the economy, efficiency and convenience of electric power for all industries of the West—manufacturing, agricultural, mining, merchandising, home building and home making. Interpreting the value of electrical development to the business and financial man, the industrial man, the power man, wholesaler and retailer, contractor and constructor, engineer and home owner.

Because of the abundance of water power in the West susceptible of economical development, a dependable, uninterrupted supply of cheaper electric power is assured for these industries. The basic industry of the West—hydro-electric power generation—for which Journal of Electricity and Western Industry is the spokesman, is therefore logically and inseparably linked to the growth and prosperity of all phases of our daily life and business.

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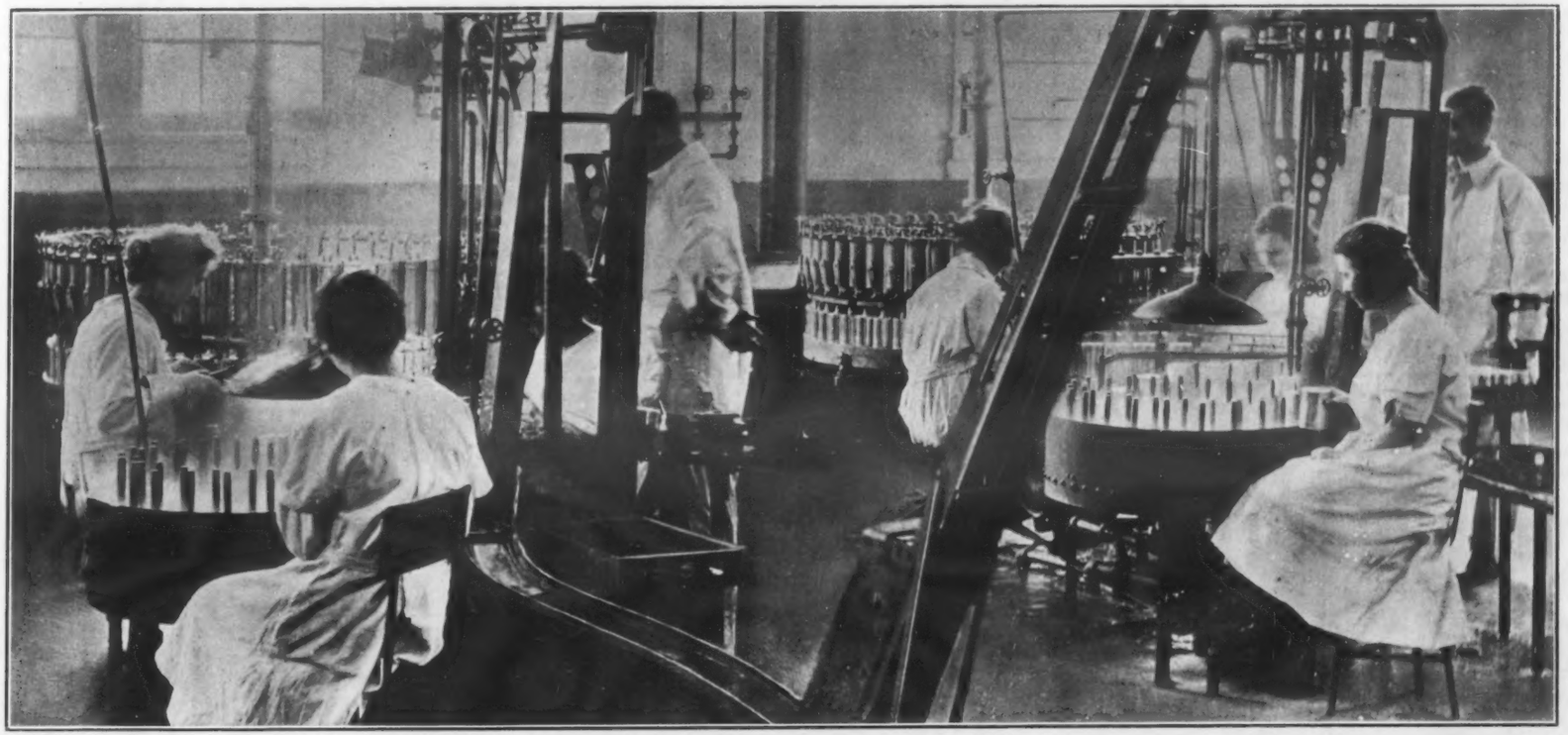

The West Leads in Electrically Operated Material Handling Devices

THE work formerly done by twenty girls is performed by the one-half horsepower electric filling and sealing machine shown in the Chehalis factory of the Carnation Milk Company. This is but one of the many uses to which electricity has been adapted in this thoroughly modern plant, and is a striking example of the economies which may be effected by the intelligent utilization of the servant, electricity. The world is familiar with the utilization of electrical energy in the West for pumping purposes in the oil fields and irrigated agricultural districts, in dust control in cement plants, for magnetic handling of scrap iron, in the operation of gigantic gold dredges, and other large scale operations. Many other ingenious industrial applications of electricity in technical processes, for material handling and for power purposes are perhaps not as well known, but are of equal importance. In every phase of western industry from the detailed processes of manufacture to the fundamental motive power of great industries, where economy, cleanliness, flexibility and improved operating conditions are desired, electricity is utilized.

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Journal of Electricity and Western Industry

A McGraw-Hill Publication

ROBERT SIBLEY, EDITOR

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Norman S. Gallison Clotilde Grunsky George C. Tenney

Vol. 47, No. 12 SAN FRANCISCO, DECEMBER 15, 1921 Per Copy, 25 Cents

Need for Closer Cooperation in the New Year

THE electrical industry throughout the West is today leading the nation in its spirit of helpful cooperation, organized in channels of practical service. The columns of the Journal of Electricity and Western Industry have too often set forth the splendid achievements of these various cooperative campaigns and service leagues to dwell in detail upon such matters here. Suffice it to say, that in such institutions as the California Electrical Cooperative Campaign, the Northwest Electric Service League, the Rocky Mountain Electrical Cooperative League, the Denver Electrical Cooperative League and the British Columbia Electric Service League, the West has found an important avenue of expression, alike for advancing helpful principles of merchandising within the industry and the forwarding of the electrical idea among the public generally.

The year ahead has in store the meeting of a crisis in the electrical industry in more departments than one—and the need for the western organization which shall be in a strategic position, both to better conditions at home and to strengthen relationships abroad, is more urgent than ever before. The question of financial support for these cooperative leagues again comes forward with the new year. Manufacturer, jobber, contractor-dealer and central station alike concerned in seeing that, as in former years, these institutions stand firmly with the entire industry behind them. You cannot afford to leave any doubt of your whole-hearted support of moves of this nature.

What Is the Problem of the Colorado?

NO one can contemplate the tremendous architecture of the Colorado River's making without realizing something of the scope of the power latent in the muddy waters of that erratic stream. In its ultimate development, it represents power possibilities of some four million and a half horsepower, and the irrigation of some million acres of arid lands, as well as the control of seasonal floods which in past years have wrought destruction in the Imperial Valley and neighboring agricultural developments of the Southwest. The Colorado is at once the great problem and the future promise of an empire which includes seven major states of the West in addition to two states in northern Mexico.

The first prerequisite to any development of the river is the establishment of an all-comprehensive plan that will in its ultimate scope bring these waters to the maximum service of the people for irrigation, for flood control and for power development. With this general plan agreed upon, every reasonable endeavor should be made to get the first stages of this development under way at the earliest possible moment.

A generation soon passes. With the tremendous industrial and agricultural development going steadily on throughout the West, even through such periods of world-wide business depression as the one just ending, there will soon be a bitter need for both power and water to an extent that only the Colorado can supply. If wrangling and red tape are allowed to stand in the way of its present development, the power and the water will not be available when the need arises and the coming generation of builders will suffer from our lack of foresight. We must provide for the future.

A Monthly Page of Cooperative Advertising

COOPERATIVE pages appearing weekly in the city newspapers of the West are of unquestioned benefit and the movement which was started in the early days of the California Electrical Cooperative Campaign has spread to communities up and down the state and elsewhere in the West under the encouragement of the respective cooperative leagues. Many of the smaller cities, however, do not offer sufficient returns to warrant the carrying of a weekly page. In such cases, advertising is apt to be scattered and in consequence in large measure ineffective. The example of the Grass Valley contractor-dealers who have joined together in a monthly cooperative electrical page suggests a way out of the difficulty. The advantages of the combined appeal are thus made possible without too great an expense or burden upon any one dealer. The idea is one to be recommended to other small communities of the West.

Exhausting the Lumber Supply in Thirty Years

AMERICA is the greatest lumber user of the world. This country produces more than half the lumber supply of the globe and uses 95 per cent of that amount within its own boundaries, according to Col. W. B. Greeley of the United States Forest Service.

Manufacturing centers are drawing at an enormous rate upon the timber supply—from two to four times as fast per capita as the country at large. The railroads require 125,000,000 wooden cross ties annually. The average American uses 125 pounds of paper a year, made largely from wood. A well-kept farm will require something like 2,000 board feet of lumber for its yearly needs. These are just one or two uses of the many which are fast helping to wipe out the standing timber supply of this country. One estimate of the life of the lumber industry of the Northwest has placed it at the outside at thirty years.

What is needed is not so much a decreased use of the timber supply—we cannot ask industry to stay its progress for the lack of wooden parts—it is rather the building up of a timber growing industry to parallel the timber-cutting industry.

We have more than 80,000,000 acres, an area greater than all the forests of France, Belgium, Holland, Germany, Switzerland, Spain and Portugal, which have been denuded to the point of absolute idleness so far as the production of any timber of commercial value is concerned. We have other enormous areas of cut-over land now growing but a fraction of the amount of timber which they might produce. And we are adding to these areas of idle or largely idle land from 10,000,000 to 15,000,000 acres every year, as destructive logging and still more destructive burning progress.

This situation cannot long continue without grave consequences. If we are to remain a nation of wood users, we must become a nation of wood growers. By some means or other we must see to it that forest lands not needed for agriculture are not allowed to lie idle, but are kept at work growing timber.

What Do You Mean— Back to Normalcy?

IN spite of advices to the effect that western industry is almost back to normal, advertising is still languishing, sales campaigns are somewhat less frequent, fewer firms than usual are finding it possible to keep salesmen in the field. Half the business world, apparently, is holding its breath and counting ten, awaiting the time when full "normalcy" shall again shed its glow upon the land. There is so much that is psychological in the whole matter of financial depression that it is questionable to what extent this is a necessary economic result of post war taxes and lessened demand and how much of it is merely atmosphere.

What are normal times? There is no question but that prices are lower and volume of sales less than, say, during the Christmas of 1918. But we question very much whether they are lower than the midsummer season of ten years previous. A glance at the business reports will convince anyone that the "times" are always either growing better or worse, the cheerful "better days tomorrow" which is characteristic of periods of depression giving way gradually to a gentle pessimism as the sales and collections increase. At what point shall we set the pointer to read normal?

As a matter of fact, health in business, as in the life of the individual, is very much a personal matter. One line of business may have felt the lessening of purchasing power long before any other line in its vicinity was affected—and, due to its maladjustment to the price levels, have suffered in the midst of surrounding prosperity. On the other hand, a business fully alive and so situated as to be able to take advantage of shifting conditions, may have caught the trade which others let slip and actually have improved its situation during hard times.

It is possible to indicate, of course, whether the average amount of all commodities purchased is increasing or decreasing—but this means just what it says and should not be interpreted to mean much more than that. Every man must be the judge of whether his business is in a satisfactory condition or not—and if not, it is his problem to exert special effort to make it so. It is too easy to blame poor business methods on poor times. Let us worry a little less about normalcy and concern ourselves, not with comparisons of our business with pre-war and post-war incomes, but with the establishing of conditions which will be satisfactory in themselves, by business methods which are "good business" whatever the state of the barometer.

The Other Side of the Water and Power Bill

ON another page of this issue appears a letter to the editor from Louis Bartlett, mayor of Berkeley and president of the California League of Municipalities, which presents the arguments in favor of the proposed California water and power initiative act to come up for consideration at the election of 1922. It is the policy of the Journal of Electricity and Western Industry to open its "Letters to the Editor" column to all communications which comply with requirements of length, do not contain palpable misstatements and are not personal in tone, whether the editor agrees with the attitude taken by the author or not.

In the case of the power act in question, the attitude of this paper was expressed in the comments appended to the text of the proposed measure appearing in the issue of November 1st, and anyone interested in going into the matter in detail is referred to that analysis. In the opinion of this paper, there are many obvious objections to the act as proposed, chief of them the creation under its provisions of a board of five men politically appointed, in whose unsupervised control are placed the entire resources of the state of California. This board not

only may draw upon the credit of the state to the enormous sum of one-half a billion dollars, but it may command any of the power, water or other resources of the state to the extent which it deems necessary to carry out its work. This does not refer alone to resources as yet undeveloped, but may include any system or part of the system of any power or industrial company which seems desirable. More than this, if the calculated returns from the power sold are not sufficient to meet the interest or capital of the bonds to which the state has lent its credit, this board may draw to an unlimited extent upon the state treasury to make up the deficit, or even levy special taxes if necessary (see Section 9 of the Act). Of course, this eventuality is not anticipated, as Mr. Bartlett points out,—but who has not known municipal and state enterprises which were not successful and who is to guarantee that the members of this board will not be more concerned with their political reappointment and the privileges of their office than with the saving of the state funds?

This act is undoubtedly the most important that has ever come up before the voters of the state of California and every man interested in any way in the development of the state is urged to familiarize himself with its provisions in detail.

Transportation Problems and the Western Steel Industry

IN the continued march of western progress, steel holds an important position. The quantities consumed are increasing from month to month. Why then, should western manufacturers who deal in fabricated shapes or other iron and steel products, find their business on the decrease? The answer is that keen competition with the steel center of the eastern states, aided by inequalities in the freight rates on steel, is a combination which prevents western firms from securing their share of this business.

A recent case in point is found in the present situation in the Southwest. For years the use of riveted steel pipe for water and gas mains has proven successful and economical in the West and has afforded a market in which western firms have been comfortably able to compete. Under recent freight conditions, it was possible to import Belgian cast iron pipe direct from Europe laid down on the Pacific seaboard for less money than pig iron shipped from our eastern states. Just now the steel firms of the East are accused of maintaining the price of steel sheets and dropping on cast iron pipe. The western manufacturers of rolled steel pipe are thus caught between two conditions, neither of which they can have a hand in correcting.

Again, if structural steel can be shipped into the West at the same freight rates as bare shapes from the rolling mills, the fabricating shops of the coast states have slim chance of continuing in this business, especially during the construction lull in the East. Because the established steel centers are taking advantage of every condition in transportation or manufacture to maintain their volume of business, western industry is made to suffer. Not until a western iron and steel industry is developed on such a scale as to make the West independent or nearly so, can the economic unbalance of eastern conditions be prevented from introducing such crippling influences into our western enterprises.

Fire Prevention and the Convenience Outlet

FIRE Prevention Day, followed by propaganda through moving pictures and the press has called especial attention to the dangers in unauthorized wiring and in the careless handling of electrical appliances. A further angle which should not be overlooked in the interest of the wider use of convenience outlets, is the danger resulting from an overburdening of lamp sockets. There is no need to frighten the public by alarmist advertising, but electrical men know from many years of experience that many factors of safety would be introduced into the household if the convenience outlet had the attention in home building to which it is rightfully entitled. The use of multiple attachments and the pull and strain upon wall and ceiling fixtures were never considered as part of their regular usage. It is time that manufacturers should cease advertising "lamp socket" appliances, as well as showing devices in illustrations attached to lighting fixtures. The convenience out let campaign deserves the united support of the industry, as well as of those outside factors who are interested in the promotion of safety in the home.

Is Electrolysis the Explanation?

IT is sometimes very difficult to determine the cause of internal destruction, or eating away, in centrifugal and turbine pumps. The best engineering thought has frequently disagreed over the use of the words erosion, corrosion, and electrolysis; in the sense that these terms signify wearing action, chemical decomposition or electrolytic disassociation.

Recent examination of deteriorated material from deep-well turbine pumps in the San Francisco Bay district gives indication of electrolysis. These pumps are used in the supply of water for domestic purposes and have been showing a short life of but fourteen months on some of the wearing parts. Analytical chemists aver that the nature of the water itself precludes any possibility of the destructive action being due solely to the water. Other chemists after analysis of the metals—both new and worn samples—are equally positive that the metal is without fault which could account for the rapid deterioration.

The importance and economic value of a satisfactory solution is at once recognized when it is known that 34 turbine pumping installations are in use by one company in the Bay District, and similar difficulties have been experienced in other localities. A remedy, either as an external or perhaps internal preventative is no doubt assured, and western engineering will record still another achievement in one of its most important branches.

Western Comment on Current Events

Editorial Notes and Readers' Views on the Outstanding Aspects of Financing, Trade Promotion, Legislative and Associated Topics that have a Special Bearing on Western Business

Portland Votes for 1925 Exposition

Final Decision Depends Upon Action of Next Oregon Legislature on Three Million Dollar State Tax Measure

THE result of the recent Portland election on the $2,000,000 city tax to finance the 1925 Portland Exposition was overwhelmingly in favor of carrying out the enterprise. With the $1,000,000 which has been pledged from private subscription, this provides for the city's contribution. It remains only for the state legislature to pass the prescribed quota of $3,000,000 which is to be raised by state taxes. There has been much opposition to the Exposition which some of the more conservative business men have felt was too much of a drain on the state under present conditions of less than normal prosperity, but the popular campaign in its favor has evidently carried the day and it is expected that the state legislature will probably also take favorable action in the spring.

Water Shipment of Fruit Increasing

Comparison of Rail and Steamer Shipment Indicate Growing Use of Water Route for Fresh Fruit

DECLARED shipments of fresh fruits in refrigerated or ventilated space through the Panama Canal during the eight months ended August 31, 1921, aggregated 7,132 tons, according to the Panama Canal Record. Of this quantity, 5,927 tons were shipped from the west coast of the United States, 1,193 tons from Australia and New Zealand, 10 tons from the west coast of South America, and 2 tons from the west coast of Central America.

All of the fruit from Australasia and 149 tons of that from the west coast of the United States, an aggregate of 1,342 tons, went to the United Kingdom. The 2 tons from the west coast of Central America were discharged at Cristobal, and the 10 tons from the west coast of South America went to the United States. The 5,927 tons from the west coast of the United States were distributed as follows: To the United Kingdom, 149 tons; to other countries of western Europe, 1,023 tons; and to the east coast of the United States, 4,745 tons.

In the fresh-fruit trade the unit is boxes rather than tons. Counting 30 boxes to the long ton, the shipments through the canal for the period aggregated 213,960 boxes, and those from the west coast of the United States 177,810 boxes.

To be compared with this are the carload figures of California fruit shipments to the East as reported October 1st. These show an increase of 5,357 carloads over last year.

	1920 Carloads	1921 Carloads
Cherries	494	665
Apricots	312	284¾
Peaches	3,107¼	3,333¾
Plums	2,533¼	3,099¼
Pears	4,317¼	4,071¼
Grapes	21,805½	26,551
Miscellaneous	306¾	228
Total	32,876½	38,233

Adding to the foregoing figures the carload shipments of citrus fruits for the year ending October 31st renders an imposing total, 48,075 carloads of oranges and 11,807 carloads of lemons having been shipped for the season, as compared with 35,638 carloads of oranges and 9,029 of lemons for the season of 1919-1920.

Pacific Coast to Have Forest Roads

$15,000,000 Appropriated for Road Building in National Forests to be Spent Largely in the West

WITH the signing of the Federal Highway Act, an appropriation of $15,000,000 for forest roads and trails is made available. The bill provides $5,000,000 for immediate expenditure and makes an additional $10,000,000 available on July 1, 1922. Over $2,100,000 of the $2,500,000 which is to be immediately spent upon roads of primary importance to the regions within and adjacent to the National Forests, is apportioned to the states located west of the Rockies, as follows:

State	Amount
Alabama	$ 1,290
Alaska	258,273
Arizona	154,140
Arkansas	18,636
California	395,763
Colorado	180,539
Florida	6,648
Georgia	3,541
Idaho	278,944
Maine	731
Michigan	943
Minnesota	15,777
Montana	234,094
Nebraska	2,924
Nevada	55,352
New Hampshire	9,343
New Mexico	119,639
North Carolina	7,370
Oklahoma	1,495
Oregon	310,749
Porto Rico	385
South Carolina	416
South Dakota	20,511
Tennessee	5,760
Utah	98,529
Virginia	6,941
Washington	189,870
West Virginia	1,598
Wyoming	119,799
Total,	$2,500,000

A provisional apportionment of the $7,000,000 additional for roads of primary importance to public travel will be made by the Secretary about January 1.

One new feature of the bill is that the cooperation of the states is not made a requisite, as in previous acts, in the expenditure of appropriations for National Forest roads. The law, however, permits the Secretary of Agriculture to receive cooperation, and Forest Service officials believe that undoubtedly considerable amounts will be offered, thereby augmenting forest road construction.

Hawaiian Labor Situation Improving

Wages Reported Considerably Reduced on Island Sugar Plantations with Prospects of Early Relief

REPORTS of conditions on Hawaiian sugar and pineapple plantations as received by Pacific Coast stockholders in the island sugar companies indicate that the labor situation which this summer was regarded as critical has greatly improved. For some months conditions approximated those of a strike, owing to the refusal of local labor, mostly Japanese, to work for wages within the range of possibilities. An appeal was made to Congress to permit the importation of Chinese labor under proper restrictions to work upon the plantations for a term of years. In the face of this possibility, it is said that wages have been considerably reduced and that the prospect of obtaining Chinese laborers is regarded as brighter. The importance of Hawaiian prosperity to Pacific Coast industry, which handles the refining and marketing of the island products, makes the satisfactory solution of the labor question one of particular interest to the West.

Municipal System Rejected by Voters

Oregon Election Indicates Roseburg Voters Satisfied with Present Private Utility Electric Service

SENTIMENT in at least one community in Oregon is against experimenting with a municipal light and power system if the results of the special election held in Roseburg, Oregon, on November 1 for the purpose of voting on the issuance of bonds to build a municipal power plant and distributing system, may be taken as a fair expression of the wish of the people of the city. Although the city still has the authority to issue $500,000 in bonds and proceed with a new plant by virtue of authority granted in an election several years ago, it is very doubtful that it will make this move in the face of the adverse vote. It is also very doubtful whether $500,000 would be sufficient to build a power plant and the necessary distribution system. It is reported that the private utility now supplying the city is rendering adequate and reliable service and is willing to make any necessary extensions and improvements to its property which may be necessary to properly take care of the needs of the community and there seems to be no occasion for a municipal adventure in this field.

Northern California Rain Shortage

Fifty Per Cent Shortage to Date Through Northern California Indicates the Possibility of Dry Season

WEATHER Bureau reports indicate that precipitation to date for this season is about normal in southern California, but throughout the central and northern portions of the state it was less than one-half of normal. Light snow fell in the Sierras, but most of it melted before the close of the month.

The weather on the whole has been favorable for agriculture, especially in the citrus industry and for the drying of fruits, and harvests have been satisfactory both in quality and quantity. In general, however, early storms have taken a northerly course, bringing something of Mexican rainfall to the southern district, but carrying the precipitation of the northwest storms well above the California district. This is the type of weather characteristic of dry seasons and although, of course, no prediction is possible at this early date, the fact is regarded as significant in engineering circles.

Women Further Public Policy Work

Educational Program Planned by Women's Committee as Auxiliary to N. E. L. A. Public Policy Campaign

PLANS for the coming year were outlined at the recent meeting of the Women's Public Policy Committee of the National Electric Light Association. It was felt that the greatest need of the moment is the education of women within the electrical industry in the fundamental facts and policies of the industry as a whole and in consequence a series of lectures and publicity has been laid out which it will be endeavored to have presented in all sections of the country. The tentative program as now outlined has assigned the following topics for the first four months of the year:

January—Public Relations, Facts, Figures, Investments and the Business as a Whole.
February—The Home Electrified.
March—Electric Cooking—Demonstrations.
April—Relation of Employes to the Public—Courtesy and Goodwill.

It is hoped to follow this campaign up by articles and publicity in the technical press and in women's journals, as well as to review present good will advertising carried by national and local organizations with a view to incorporating in it the woman's point of view.

It is interesting to note in this connection, that several of the western power companies have already instituted lecture meetings for their women employes and that more than one of the local electrical luncheon organizations has followed the recent example of the San Francisco Electrical Development League in featuring Women's Day with a program designed to educate the women along electrical lines.

Letters to the Editor

Cooperation Among Engineers Asked as Aid in Improving Industrial Situation

To the Editor:

Sir: Having just read Mr. Leurey's article, "Progress of Industry Handicapped by Lack of Engineers," appearing in your issue of November 15th, I wish to express my enthusiastic approval of Mr. Leurey's timely statement and to give it all the support I can.

Mr. Leurey has put the matter so well and fully that I have nothing to add but rather wish to emphasize his remarks. The lack of electrical engineers in positions of responsibility and initiative with industrial organizations has become a real handicap to further progress. In part, this is due to the rapid growth in the application of electricity to industry, coupled with the inertia of existing customs; but it is also due to lack of cooperation among electrical engineers themselves. Obviously, owners and managers of industrial enterprises need educating; but those of us who represent selling organizations either for goods or for power are scarcely in a position to point this out to the said owners or managers; nor are those of us who are open to employment by industrial concerns in a better position, since we seem to be seeking personal advantage. Cooperation is needed.

I have been reading also, in the November issue of the Journal of the A. I. E. E., about the work of the Engineering Council and particularly about the investigation of Waste in Industry, as first suggested by Mr. Herbert Hoover. Well, Mr. Leurey has pointed out one kind of industrial waste that it should be rather easy to attack.

B. B. BECKETT,
Consulting Electrical Engineer.

San Francisco.

A Protest from Los Angeles Against Careless Fire Hazards in Industrial Districts

To the Editor:

Sir: Rome was almost destroyed by fire. The wealth and industry of Romans went up in smoke. How did the fire start? That is of no more consequence than the tune Nero fiddled while Rome burned. Nero's indifference was perhaps less reprehensible than the apathy of the average manufacturer when it comes to fire hazard.

Vernon is part of Los Angeles—so the Chamber of Commerce says in its manufacturing statistics—but the annexation process around the city of Los Angeles left Vernon still claiming city rights in her own name. Manufacturers searching for cheap factory sites have poured millions of dollars into industries for the West not thinking of the hazard from fire that exists in Vernon.

It is a peculiar situation when an industrial plant will not carry insurance sufficient to cover complete loss by fire, when it will not install modern fire-protection equipment, and when it will locate in a city that admits having inadequate fire protection.

Nearly one million dollars in fire losses have been added in the last few weeks to the totals for the state of California, by this little city of Vernon. The insurance premiums of this state must pay for the maintenance of a going insurance business and in the face of such conditions, Western Industry should wake up!

When a sprinkler system or other adequate fire protection equipment will pay 15 per cent or more a year on its investment by reductions in insurance premiums alone, what in the world can be the matter with the manufacturer who hesitates to provide his plant, his employes, and himself with the proper safeguards against disaster? That "he who hesitates is lost" is manifest in the history of three recent fires in Vernon, when the combined losses—in excess of the insurance carried—amounted to hundreds of thousands of dollars. And these three plants had turned deaf ears to fire protection experts for more than a year, knowing all the time that in case of fire there could be little help from their own city of Vernon, and the outside help—if sent—would be without means to check a big fire.

Manufacturers should fully awaken to such conditions as may exist in their plants and those adjoining them. A logical solution should be found quickly, for the elimination of such wanton waste in industry. No time should be lost in taking steps to permanently safeguard the lives, property, and business of manufacturing communities.

C. K. CHAPMAN.

Los Angeles.

League of Municipalities President Defends California Water and Power Act

To the Editor:

Sir: In reply to various questions regarding possibilities of increased taxation through the adoption of the so-called California Water and Power Act, I should like to state the position of those who are advocating the measure:

It is true that the "full faith and credit" of the state is behind the bond issues to finance this development work. This is done that money for development work may be borrowed at a low interest rate. But increased taxation is neither contemplated nor possible under the amendment. The act creates a Water and Power Board of five members. When any locality comes forward with a project, the board first determines the technical feasibility of the work and obtains proof that it will produce a definite amount of water or power. It then makes certain that there is a sufficient market for the water or power by obtaining contracts with cities or other political subdivisions that agree to take the water or power at rates (to be fixed by the commission) which will take care of interest, operation, depreciation and maintenance, and write off the principal indebtedness in fifty years. The Board then applies to the Finance Committee, also created by the act, for authority to issue and sell bonds, only to the extent required for this particular project. This committee consists of the Governor, the State Treasurer, the Chairman of the Board of Control, Controller, and the chairman of the California Water and Power Board. The bonds are then issued and sold.

It will be seen that the public venture is thus safeguarded in exactly the same way as the private enterprise, which must obtain its authority from the State Railroad Commission. There is no essential difference in principle, but a real difference in the safety of the plan, for the state acts only on the signed contracts of political subdivisions (none of whom have ever repudiated a contract), while the public utilities obtain their permits to issue bonds on a showing of the probability of a profitable market. Those who drafted the bill did not place the public projects under the authority of the Railroad Commission, as the function of that body is primarily rate fixing, and, under the plan of public development, rates are automatically fixed on a cost basis; so there was no reason for placing regulation in the hands of the commission.

The question has been asked as to what would happen if any of the state projects should fail to bring returns. It is pointed out that the act places the taxing power of the state behind all projects. For light on this problem, let us consider what happens when a privately owned utility finds it cannot get returns on its investment. It applies to the Railroad Commission for an increase in rates. This increase means increased taxation and nothing else for it is the consumer who ultimately pays. Eventually the same things would happen under California's Water and Power Act. The rates would be raised to bring a proper return. The bill specifically allows the board to develop a surplus sufficient to keep it a going concern, and with free access to 8,000,000 hp. of hydroelectric energy and 30,000,000 or 40,000,000 million acre-ft. of water, with the ability to borrow money at about two-thirds the interest rate that must be paid by private companies, there is no danger that the system will be unable to carry any project which may possibly prove unprofitable.

LOUIS BARTLETT,
Mayor, Berkeley, California.
President, League of California Municipalities.

Southern California Plants Use Pelton Wheel as Well as Those of Northwest

To the Editor:

Sir: I was much interested yesterday on receiving our copy of the Journal for November 15th, and reading the summary of present power development as given on page 386. Frankly though, I do not see why a journal devoted to western industries should be so hesitant about mentioning the name of the only company in the West that manufactures hydraulic machinery. Our company is credited with the Spring Gap plant and Cedar River plant, but no mention is made of Pelton in connection with Big Creek No. 2, Kern River No. 3, the Adams plant of the Southern Sierras Company, nor Nehalem plant of Seattle. Thirty-three per cent is a good batting average, but it is not a high standard of technical accuracy. It seems to me that a correction is in order.

A. T. PARSONS, Advertising Manager,
The Pelton Water Wheel Company.
San Francisco.

Attitude of the Woman Customer Regarding Merchandising of Appliances

To the Editor:

Sir: In the October first issue of the Journal of Electricity and Western Industry appeared a letter to the editor from Los Angeles, complaining of the practice of certain electrical dealers of carrying several lines of electric irons. Naturally, says the writer, the customer bought none of them. As a woman, not only interested in the electrical industry but also, as are all women, a purchaser of household equipment, I wish to refute what seems to be a general male conception of feminine psychology. No woman ever buys anything of importance without investigating the entire available market. If she is purchasing a suit she will try every store in town before she goes back and purchases the suit she liked in the first store she visited. She wants to know that she is getting the most that she can for her money. This is equally true of washing machines, vacuum cleaners or electric irons. I think ninety-nine out of every hundred women will state that they prefer to have a dealer carry an assortment of various lines of equipment so that they may make their selection without traveling all over town, rather than only one which he claims to be better than all others.

ONE OF THOSE WOMEN.
San Francisco.

Radio Bulletins

The Journal of Electricity and Western Industry is sending out each week by radio-telephone a report on the outstanding engineering and industrial developments in the eleven western states, together with a concise review of business conditions in the principal cities in this district. The following excerpts are representative items taken from messages sent out.

From all parts of the West reports and suggestions are coming in regarding the weekly industrial and engineering news and business report which is being sent out by the Journal of Electricity and Western Industry from the station of Colin B. Kennedy Co. at Los Altos. We want your opinion of this service. What have you to offer in the way of suggestions or comments? Send in your answer to the editor of the Journal of Electricity and Western Industry, San Francisco.

The Journal this week offers the following program of radio telephone service which emanates from San Francisco, the list having been prepared by the Pacific Radio Trade Association:

Every Afternoon Except Sunday.—3:30-4:30 p.m.: Atlantic Pacific Radio Supplies Co. Concert. 4:30-5:30 p.m.: Leo J. Meyberg. Press, Market and Concert.

Every Night Except Sunday.—7:00-7:10 p.m.: Atlantic Pacific Radio Supplies Co. Press—Sports and Foreign. 7:10-7:20 p.m.: Hotel Oakland. Press—General News. 7:20-7:30 p.m.: Leo J. Meyberg. Press—Financial and Weather.

Sunday—10:00-11:00 a.m.:Leo J. Meyberg. Concert. 11:00-12:15 a.m.: Trinity Center. Sermon. 12:15-1:00 p.m.: Warner & Linden. Concert. 7:00-9:00 p.m.: Presidio. Concert and Instruction.

Monday.—7:30-8:30 p.m.: Colin B. Kennedy. Concert and Industrial News. 8:30-9:00 p.m.: Leo J. Meyberg. Concert.

Tuesday.—12:15-1:00 p.m.: Warner & Linden. Concert. 7:30-8:15 p.m.: Hotel Oakland. Concert. 8:15-9:00 p.m.: The Radio Shop, San Jose. Concert.

Wednesday.—7:30-8:15 p.m.: Atlantic Pacific Radio Supplies Co. Concert. 8:15-9:00 p.m.: Herrold Laboratory, San Jose. Concert.

Thursday.—7:30-8:30 p.m.: Leo J. Meyberg. Concert. 8:30-9:00 p.m.: Colin B. Kennedy. Concert.

Friday.—12:15-1:00 p.m.: Warner & Linden. Concert. 7:30-8:15 p.m.: The Radio Shop, San Jose. Concert. 8:15-9:00 p.m.: Hotel Oakland. Concert.

Saturday.—7:30-8:15 p.m.: Warner & Linden. Concert. 8:15-9:00 p.m.: Atlantic Pacific Radio Supplies Co. Concert.

N. B.—Atlantic Pacific Radio Supplies Co. schedule will start in on about December 7. Trinity Center schedule will probably start about January 1, 1922.

The Doherty interests of New York, owners of a system of electric plants throughout the middle west, have filed an application to develop 65,000 horsepower on the Colorado River.

Richmond, Cal., will spend a quarter of a million dollars during the next six months for harbor improvements.

Merced, Cal., has voted favorably on a $12,000,000 bond issue for the development of one of the largest irrigation systems in the West.

Word comes from China that the Orientals are marveling at the wireless telephone, which is being demonstrated there by Professor C. H. Robertson of the Western Electric Company. In Shanghai, fifteen thousand Chinamen heard the first lecture and so great was the effect upon them that over 300,000 curious Celestials came to see the man talking with a mysterious voice in space.

Builders of the West

WHEN a frail eastern boy of 18 walked up to a rancher's cabin in the San Fernando valley of California, back in 1882, and insisted on sleeping in a straw-pile, the rancher, whose name was Hudson was doubtful if he would live over night. Harry Chandler, now president and general manager of the Los Angeles Times Publishing Company, who was the tall thin boy mentioned above, was born in Landaff, New Hampshire, and was forced to come to California for his health. Coming to California was a great thing for him. He meant to get well, and succeeded to such an extent that a few years later he defended himself in fifty fist fights in one day. He had won those battles much as he has since, by being sure to be on the right side of the controversy and never giving up.

HARRY CHANDLER

President and general manager of the Los Angeles Times Publishing Company, who is one of the great leaders in the agricultural and industrial development of the Southwest, and one of the men responsible for the rapid growth of Los Angeles.

In 1885, after spending three years in farming and truck gardening, necessity drove him to ask for a job on the Los Angeles Times and neither dynamite nor infernal machines could blow him out of it, as later events proved.

During the 36 years with this newspaper which he now heads, the twinkling lights of a town of 16,000 have grown into a city 40 times its size, while he looked on night after night from his midnight job on a morning paper. Many trails in the progress of western development have led past the door of Mr. Chandler's office and it is said that he always drops his work and joins the movement. Perhaps this is because his midnight watches of a morning paper have taught him to beat double time in his office while the rest of the Southwest sleeps.

His friends say you need never worry about where "Harry" stands on a question. He is either for or against it, if interested at all. With a far-seeing vision wisely directed by the records of his own observation and experience, he is working tirelessly for the development of the "back country," as he calls it. At the present time he is active in agricultural development in the lower Imperial valley, where the California-Mexico Land and Cattle Company is well known for its extensive irrigation and drainage system. The twenty years that he and his associates have spent in this ranch project have paid them no dividends, but the experience gained has been of immense value to the entire lower valley of the Colorado River.

In connection with the development of water power and further irrigation projects on the Colorado River, he thinks that Los Angeles should have the power brought to her or sold to her at some point in the state, without the necessity of the city going into a business enterprise outside of California.

Mr. Chandler has been persistent in the organization, financing, and directing of enterprises of all descriptions, leaving them when they have passed the infancy stage, only to welcome—later on—an opportunity to help launch still another western industry. Much of the credit for the vision which has made possible the rapid growth of Los Angeles from a small village to one of the metropolitan centers of the Pacific Coast and of the United States, goes to Harry Chandler for his direction of the policy of the Los Angeles Times, the paper he owns. Through its columns he has "told the world" of the possibilities of the city.

Based on the scope of his studies and the judgment of so many years of experience, some of his prophecies are interesting. He believes that suitable coking coal from the San Juan Valley should give California pig iron at Pittsburg prices. Fuel coal will be shipped from Kamchatka across the Pacific and laid down in this country at $4.00 per ton. Private development of the country's resources will, if continued, be more desirable than the shifting responsibilities of municipal ownership of business enterprises.

As a lover of the great outdoors and an advocate of the policy of making our national parks year-round recreation grounds for everyone, Mr. Chandler has been instrumental in the development of the mountain outing places for which the state is famous. In his position as director of the Yosemite National Park Company, he has aided in the growth of that national park from a state of comparative oblivion to one of the nation's most popular scenic recreation centers.

To Harry Chandler, because he has the courage of his convictions, for his keen insight into the future, and for his well deserved reputation as a "fiend for work," in the upbuilding of the West, this issue of the Journal of Electricity and Western Industry is affectionately dedicated.

Refrigeration and Ice Making as a Central Station Load

The Storage of Perishable Fruit and Vegetable Crops, and Refrigeration in Homes, Hotels and Apartments and the Installation of Ice Making Machinery Offer Profitable Opportunities

By CARL K. CHAPIN

NO industry of the present day can so well defend a claim to efficiency in the production and distribution of a necessity as can the electrical industry. Due to constructive imagination and inventive genius, no apparatus in the hydro-electric systems of the West has less than 80 per cent efficiency, and much of it actually exceeds 90 per cent. It is true, however, that yearly load factors can be greatly improved if the industry applies the same effort to this task that has thus far characterized its advancement along other lines. Further development of the use of electrical energy in refrigeration and in the ice making industry offers central stations an ideal opportunity to increase yearly load factors and thereby decrease the idle investment in plants and distribution systems.

Natural Ice Not Readily Obtained

In a country where natural ice forms only in mountain ranges and inaccessible rivers, and where the richest yields of perishable food products to be found in the world are marketed every month of the year, the possibilities of electrical refrigeration and ice making as a central station load are tremendous.

Recent activity in the installation of refrigerating equipment indicates that too little attention is being paid to the diversified applications which are offered by western conditions. It is not the occasional installation of electric power in a commercial ice plant that makes industry as a whole profit by this application of electrical energy. It is the use of the principle of refrigeration in every conceivable manner that may be helpful to living conditions or industry in general, to the end that big units in manufacturing districts, and small units in residential sections, will all combine to increase the load factor of distribution systems as well as the generating systems of the power companies.

Electrically Driven Machinery Predominates

That manufacturers of ice are willing converts to electrically driven machines is evidenced by the results of four years' growth in one of the largest population centers of the West. In a circle 50 miles in diameter with the city as the center, 500,000 tons of ice are manufactured per year, or 1,000 tons per square mile. Of this total, 70 per cent is now made with electric power, whereas four years ago no ice making machinery depended upon central station service.

Twenty years ago, to quote the authority of the foremost technical journal on refrigeration at that time, only 200 tons of refrigeration machinery was in use in the three states, California, Arizona and New Mexico. In 1914 and 1915 approximately 3,000 tons were sold each year in the same three states, while 10,000 tons is said to have been added in 1920, of which one concern alone installed 6,000 tons in electrically driven equipment. It is worth noting that every ton of electrically driven refrigeration sold in the West has a potential value as a power consuming medium of 5,000 kw-hr. to 7,500 kw-hr. per year and for ice making this figure is doubled.

This rapid increase is but an acknowledgment of the possibilities for the use of electricity in supplying the necessary power for commercial refrigeration and ice making purposes.

Application to Other Industries

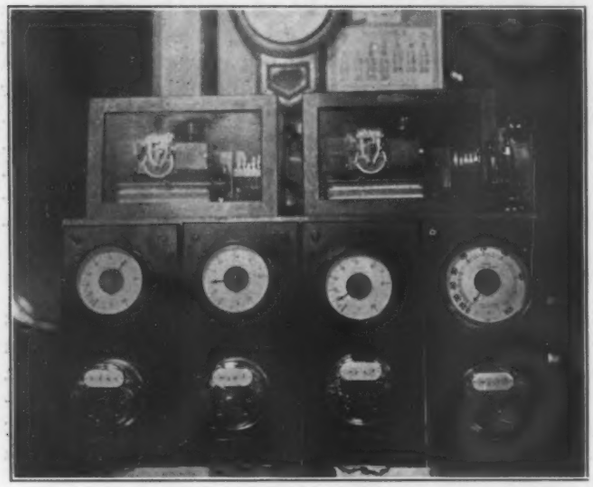
In the chemical arts many hazardous elements can be reduced or eliminated if advantage is taken of refrigeration which can be used to advantage in slowing up chemical reactions or controlling the temperatures which tend to rise abnormally during certain processing, thereby reducing the explosion hazard. Many manufacturing plants use circulating water for cooling purposes, which could be more advantageously performed by means of refrigeration. In a recent instance a paper impregnating plant with an investment of $150,000 was definitely turned from commercial failure to success by the substitution of a refrigerated cooling system in place of city water. The investment of a few thousand dollars in an 8-ton refrigeration unit thus contributed to industry in no uncertain manner.

From studies of delivery expense conducted recently it was found that in apartments where the driver must ascertain the quantity for each customer and make ticket for cash settlement at the time, the delivery expense alone for ice amounted to $5.00 and $6.00 per ton. The apartment shown serves each tenant with refrigeration piped from a plant located in the basement at a saving to them and without the muss and wear of ice delivery through the building.

In the technical departments of the great motion picture establishments we find air-conditioning chambers provided with artificial refrigeration, by which means it becomes possible to control temperatures and humidity, thus insuring speed and uniformity in the preparation of films.

By a scientific process of pre-cooling, western fruits are now shipped in iced refrigerator cars to destination points in the East without re-icing in

transit, even though 25 days should elapse between start and finish of the journey. Few packing plants are at present equipped to do this properly but pioneering and experimentation have removed all of the elements of chance. From the apple and pear country of the Northwest to the cantaloupe valleys of the Lower Colorado River many fruit packing plants are still without means of preserving their crops in the event market conditions or transportation do not permit prompt distribution. A recently proposed development in this direction is a move on the part of a California citrus growers' association to build at tide water a cold storage plant with a capacity of 200 carloads. The fruit will be collected from the various packing houses within a radius of 100 miles by motor trucks. With a fleet of steamships provided with refrigerated storage holds this association will handle its own shipments to the Atlantic Seaboard and European ports.



Freight terminals are now being equipped with refrigerated space subject to lease by shippers and the charges are based upon the actual heat units extracted from the stored product. This picture shows the equipment of the Terminal Refrigeration Company in Los Angeles, built to order for this installation. Flow meters give recorded quantities of refrigerant which pass through the given rooms, and recording pyrometers furnish a curve sheet from which mean effective inlet and outlet temperatures are obtained; from this data the actual B.t.u. absorption is calculated. The charges for refrigeration average $1.25 per ton.

As the experience of western cooperative associations becomes more widely known and better understood it is evident that the best interests of grower and consumer will depend upon further expansion of scientific storing, packing and shipping.

Improves Diversity Factor of Feeders

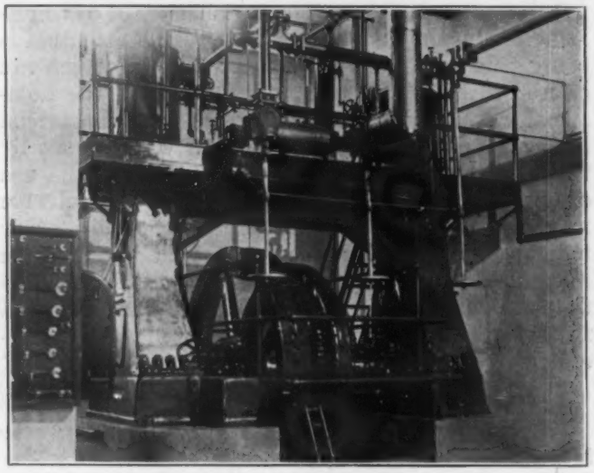
Applications of refrigeration are not confined to metropolitan districts and may be well applied to rural conditions and smaller towns where in the case of refrigeration storage, the load automatically falls into an off-peak class as the winter seasons approach. This is also the case in ice plants where more than one unit is installed, only a portion of the equipment being necessary in the colder weather. A typical case is offered in a typical city of 35,000 population. The yearly load factor is 71 per cent of full average demand against 8,760 hours possible use; the maximum summer month being 92 per cent load factor and 54 per cent for the winter. This plant has two complete units, synchronous motor-driven, and assists in power line voltage regulation by carrying sufficient excitation to have leading power-factor when desired.

Much of the Load Is Off Peak

By using non-automatic systems in connection with brine storage or freezing tanks it is possible to provide apartment houses, hotels, office buildings and factories with refrigeration and so time the operation that all normal use will occur on the off-peak hours of the system, the circulating pump being the only constant power necessary. The field of refrigeration in office buildings, apartment houses and the like, is unlimited and has many arguments of economy, cleanliness and convenience.

This is attractive business from the electrical manufacturer's standpoint due to the high standards of installation methods which must be maintained to insure dependable service, and last but perhaps the most interested of all, are the power companies who should fully realize the possibilities of adding 150,000,000 kw-hr. per year to the power systems of the West as was done during 1920. With each year opening the way to increased opportunities for the application of refrigeration engineering, who can doubt that it offers a more dependable market, with greater inherent advantages for the use of central station power than any other field so far developed?

It has often been pointed out that just as the snow and ice stored by nature in the mountains of the West furnishes a means by which the generators of hydroelectric energy may be kept running throughout the summer months, so do blocks of electrically made ice or warehouses of refrigerated produce represent stored kilowatt-hours, especially if they are produced during the "off-peak" hours. There is no section of the country which presents such a promising opportunity as do the states of the West where the seasons are such that refrigeration is necessary for many months of the year.



A recent development of electric-driven compressor requires a minimum of floor space and when equipped with synchronous motor as shown it is the last word in economy and reliability. This 65-ton refrigeration unit with a 115-horsepower slow speed motor requires only one-third of the floor space of a 65-ton belted unit in the same plant.

Electric Furnace Best for Conditions on the Pacific Coast

In Iron and Steel Manufacture the Efficiency of the Electric Furnace and High Quality of Product Offset the Absence of Coking Coal Necessary for Blast Furnace Methods

By L. J. BARTON
Consulting Metallurgical Engineer

WHEN nature so richly endowed the states west of the Rocky Mountains and on the Pacific Coast with their wonderful agricultural and mineral resources, year-round climate and wonder harbors, she apparently neglected to supply one element necessary for the development of a self-contained industrial empire. This element is coking coal suitable for use in the reduction of iron ores. Luckily, however, she provided a substitute in the form of abundant hydroelectric power, the adaptation of which in the form of the electric furnace will permit this region to be the foremost producer of high grade steel and steel alloys.

We have on the Pacific Coast great mountains of the finest ore, unlimited deposits of limerock, but no available quantities of coal. To make one ton of iron in a blast furnace one ton of good coke is required. Good coke presupposes good coking coal in unlimited quantities. The secret of cheap steel is in tonnage production and the ability to use "hot metal," that is, being able to tap the iron direct from the blast furnace, pour it into the open hearth or converter, refine and pour into ingots. This is known as the "pig and ore" process. Having no blast furnaces on the coast we are forced to use what is known as the "scrap and coke" process for open hearth steel. In this process old scrap is used in conjunction with coke, which gives the necessary carbon. This is much slower than the "pig and ore" process and consequently means higher cost.

Other Factors of Influence

Aside from the absence of sufficient quantities of suitable coal, there are other factors which preclude the operation of blast furnaces on the Pacific Coast. The first of these is the absence of markets to absorb the tonnage produced since a blast furnace, to be economical, must turn out 500 to 600 tons of iron a day, and must be in continuous operation so that the furnace may be kept hot. In addition, most western, and particularly California ore, while exceedingly high grade, is very refractory and furnishes technical difficulties when used in the blast furnace. For these reasons the blast furnace is eliminated as a practical and economical method of iron and steel production in the West. High freight rates and distance from the larger industrial centers prevent competition with eastern steel on any but a quality basis, such as the production of iron, steel and malleable castings, high grade forging ingots, alloy steels and manganese steel castings. The peculiar adaptability of the electric furnace to the production of high grade steel seems to offer a solution which will make the Pacific Coast a heavy producer of this commodity. This seems logical when we consider the availability of large supplies of hydroelectric energy from the new power stations under construction and the great program of development in contemplation. This will mean cheaper power, and cheaper power will mean that this section of the country will progress as never before in the electric furnace iron and steel industry.

There is another factor which may force the electric furnace into more general use, namely, the question of sulphur, which is fast becoming a problem. All iron after going through a cupola or blast furnace to make an iron casting contains a higher percentage of sulphur than the raw charge, caused both by the loss of iron by oxidation and from an accumulation of sulphur from the coke. This is one of the most pressing problems of the blast furnace industry.

A comparison of the two methods for making iron castings demonstrates the superiority of the electric furnace over the cupola method. In the cupola process alternate layers of coke and metal are placed in the furnace. An air blast is turned on which blows through the coke, the heat of combustion of this coke melting the iron. As the iron melts it trickles down over the hot coke, through this blast of air, onto the hearth. When sufficient molten iron has collected in this manner the cupola is "tapped" into a ladle and the iron is poured into moulds. During this process the iron collects sulphur, is oxidized by the air, and has become contaminated by impurities in the ash of the coke and possibly particles of mud and brick from the cupola lining. There is no possibility of an accurate analysis and it is impossible to obtain high temperatures of the iron with any uniformity. When thin section castings are desired high phosphorous content is used which further weakens the final product.

Superiority of Electric Furnace

In the electric furnace, the charge is placed on a clean hearth of well burned material, is melted directly by an arc without contact from any oxidizing blast of air. There is no pick-up in sulphur from coke and the metal is thus comparatively free from impurities. A lime slag can be put on which will cut the sulphur from .12 per cent down to even as low as .005 per cent in less than one hour. The metal is also thoroughly freed from any possible gaseous matter. A most important consideration is that the bath be held any length of time without change, making it possible to obtain any desired analysis with unfailing regularity. To obtain high temperatures of the iron it is only necessary to hold it in the furnace longer without the necessity of adding high phosphorous irons. This means that

the electric furnace product is uniform and far superior to the best cupola iron. A uniform product is impossible in the blast furnace. One heat may be what is desired while the next may be only suitable for such low class products as brake shoes or window weights.

The cupola advocate will of course bring up the question of cost. Let us see. In the cupola it is necessary to use about 40 per cent of pig iron. Coming from the East or from foreign countries, this means a high freight cost, making a costly product. The electric furnace uses such cheap grade materials as borings, turnings, forge clippings and flashings. Accurate operating costs have been gathered which show that the electric furnace is cheaper than the cupola. The main objection to the electric furnace is its first cost, which is higher than that of the cupola. However, it pays for itself by producing a superior product and as specifications become higher the electric furnace product will perhaps become mandatory. What is needed on the Pacific Coast today is a pioneer who will install an electric iron foundry, employ a skilled metallurgist and enter into competition with the established iron foundries. The result would be to immediately put out of business any competitor using the cupola.

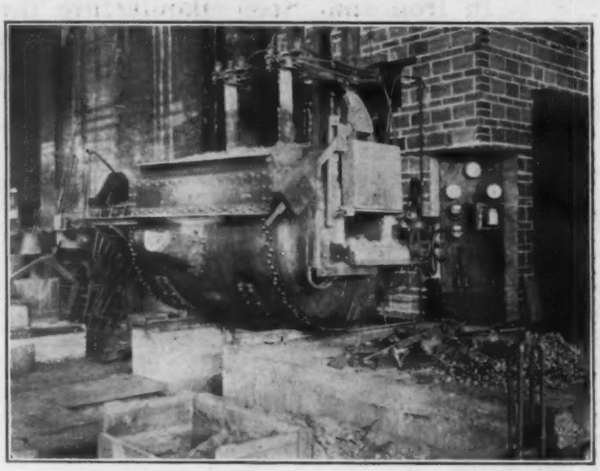
Can Produce Better Steel

Similar economies are effected in the production of steel. The open hearth cannot supply the same quality as an electric furnace and while electric steel is slightly higher in price than the open hearth, the quality more than compensates for the increased cost. The rigid specifications of the automotive and tractor industries and of the ordnance department of the army are such that only alloy steel made by the electric furnace can meet them. The crucible, of course, is eliminated by question of cost and size of work. On the Pacific Coast there are several automobile plants engaged in assembling only, which should be making their own steel. There is no shop on the coast making a high grade forging ingot. These points will be adjusted and when the time comes the electric furnace will come into its own.

There are instances where electric furnaces have been erected by organizations which either had insufficient finances or which did not understand the mechanical processes of steel manufacture. There are today an increasing number in successful operation.

Adaptability an Asset

We have discussed the superiority of the electric furnace over the older processes on costs and quality. Let us look to another important phase, adaptability. In the jobbing trade it is a great asset to be able to handle any class of work which comes in. The open hearth furnace pours from 25 to 50 tons at a heat. The metal cannot be made hot enough to handle small castings successfully and a shop having an open hearth can only cater to large work, where the margin of profit is small. Orders for small tonnages of special metals, such as alloy ingots and manganese steel castings, where the profit is large cannot be handled at all. In the same manner iron foundries equipped with the cupola cannot handle special work, where a low phosphorous and sulphur is specified, such as heavy duty valves, cylinders, piston rings. In a shop equipped with an electric furnace the following can be economically made:



Greene electric furnace in the plant of the Vulcan Manufacturing Company, Seattle, Wash. The Greene electric arc furnace is manufactured in Seattle and there are many of this type of furnace in operation in western states.

Castings.—Iron, white, chilled or grey, any analysis desired; malleable cast iron; steel, any grade of carbon or alloy analysis.

Forging Ingots or **Heat Treated Castings.**—Any class of alloy or carbon steels.

Tools.—Any class of carbon or high speed, either cast or in an ingot to be forged.

Special Products.—Electrical resistance alloys, stainless steels and magnet and transformer steels.

Smelting.—Pig iron and all classes of ferro-alloys.

Acid Resistant Castings.—Corrosiron, tantiron, etc.

Floor Space Saved

Another point in favor of the electric furnace is the ability to handle a certain tonnage on a minimum floor space, with the lowest possible amount of auxiliary equipment, such as heavy cranes, or charging machines, all of which help to lower the first cost and overhead.

One of the greatest troubles in the iron foundry of today is lost castings, usually caused by the metal being too dull to pour, causing mis-runs and cold shuts. The loss on one poor casting absorbs the profit on several good ones. This is entirely overcome by the electric furnace. A point often overlooked is that it is not entirely the furnace which means success, it is the man in charge of melting operations. In the hands of an experienced man the electric furnace is a piece of equipment which cannot be beaten for cheap, accurate and regular results. In the hands of a mediocre operator it is a useless expense.

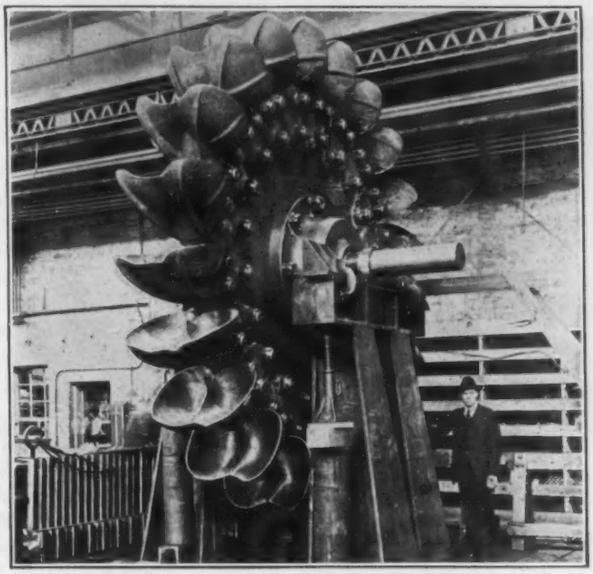
At the present time on the Pacific Coast there are nearly 40 electric furnaces, each shop handling only one or two classes of possible work. Consequently the shop is only running on part time and expenses are far too high. If a shop were to be started, with ample backing, and the determination of the organizers to handle all the higher classes of work possible to obtain, it would produce astounding results.

Caribou Power Plant Has World's Largest Impulse Wheel

In the Selection of a Prime Mover Reliability was the Dominant Feature Influencing the Choice of an Impulse Wheel for Conditions to which a Reaction Turbine Could Be Applied

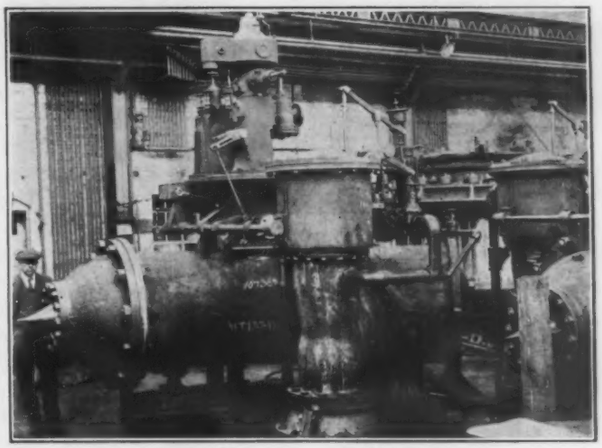
By W. M. WHITE
Engineer, Allis-Chalmers Manufacturing Co.

THE machinery installed in the Caribou plant of the Great Western Power Company is of particular interest by reason of the fact that the units are the largest impulse wheel driven machines in the world, having a normal capacity of 30,000 hp. each under 1008-ft. head, at 171 r.p.m. They possess possibly even greater interest by reason of the considerations leading to the selection of the impulse type for conditions to which a reaction turbine could be applied. This latter feature is of interest in view of the growing application of the reaction or so-called Francis type for heads between 500 and 1000 ft.



View of the assembled bucket wheel of the largest impulse wheel in the world. Each of the buckets weighs 1000 pounds and the assembled wheel 25 tons.

It is only for the past few years that the application of the reaction wheel to high heads has been considered good practice. In 1905 the installation of a capacity of 9700 hp. in a single reaction runner under 550-ft. head at the Centerville plant of the California Gas & Electric Company was severely criticized, as it meant pioneer engineering work far ahead of any precedent in the way of capacity or head for the type in question. Similarly, the 13,000-hp., 375-ft. head single runner reaction turbines installed in the plant of the Great Northern Power Company near Duluth, Minn., were openly received with considerable skepticism on the part of many engineers. These two plants, together with the 440-ft. head, 10,000-hp. units installed in the Grace plant of the Telluride Power Company, gave the engineering world the first assurance that such construction could be successfully installed and operated with commercial economy. Since that time heads up to 600 ft. have regularly been developed using the reaction type of wheel unless the capacity of the units was very small. More recently, higher head units have been installed, notably the 680-ft. head unit of 30,000 hp. in the Big Creek plant No. 8 of the Southern California Edison Company and the 22,500-hp. units under 800-ft. head installed in the Kern River plant No. 3 of the same company. Operating data on plants using reaction runners for heads as high as 800 ft. is lacking, but the leading turbine builders of the country are willing to offer large capacity units for heads probably up to 1000 ft.



Assembly of the needle regulating nozzle, pressure regulator and governor for the 30,000-hp. impulse turbine units of the Caribou plant.

The entire question involved is simply a comparison of the advantages of first cost, small floor space and higher efficiency obtainable with the reaction type of units against the greater simplicity, smaller liability towards wear, and greater ease in renewing wearing parts obtainable with the impulse type.

The choice between the two types available for the Caribou plant was made after a very extensive series of studies of different types. The multiple runner impulse wheel, for example, possessed certain advantages from a standpoint of gain in generator efficiency, due to the higher speed and saving in first cost, and due to the smaller size of working parts of the wheels. It was discarded on the overall consideration that it was not the simplest arrangement that could be worked out and would not incorporate the fewest number of working parts. It was considered that these features would in the long run intro-

duce elements of wear and complications that would defeat the economy effected by the higher speed.

The reaction unit was studied very carefully. The units were worked out in physical dimensions and, contrasted with the unit finally adopted, effected considerable saving in floor space and in the machinery proper. It also possessed efficiency characteristics several per cent in excess of those obtainable with the impulse type. In addition all of the parts to be handled during erection, and during any dismantling for renewal of working parts, were considerably lighter.

Impulse Wheel Adopted

The unit finally adopted comprises a double overhung impulse turbine each wheel of which is driven by a jet from a single needle nozzle. There are but two bearings in the unit, the generator rotor being carried between them, the wheels being carried on an overhang of the shaft outside of the bearing. This gives a compact and simplified arrangement with the smallest number of working parts.

Prior to this installation, the largest impulse wheels in the world were the 20,000-hp., 2000-ft. head units installed in the Big Creek plants No. 1 and No. 2 of the Pacific Light & Power Corporation. They are of the same general arrangement as the units in the Caribou station and were designed by the same engineers. The Big Creek units possess physical dimensions considerably smaller than those of the Caribou units. For example, the jets were in the neighborhood of 6 in. in diameter, whereas the nozzles of the Caribou units are capable of delivering jets 11 in. in diameter. Both installations, however, possess common characteristics, such as the same type of double overhung construction, the same type of needle regulation, and double arrangement of governors and pressure regulators.

It was largely the very successful performance of the Big Creek units together with a conservative policy in adhering to the most rugged and reliable type of machines that led to the selection of the impulse type for the Caribou station rather than any refined analysis of efficiency only. In other words, reliability was the dominant feature influencing the decision.

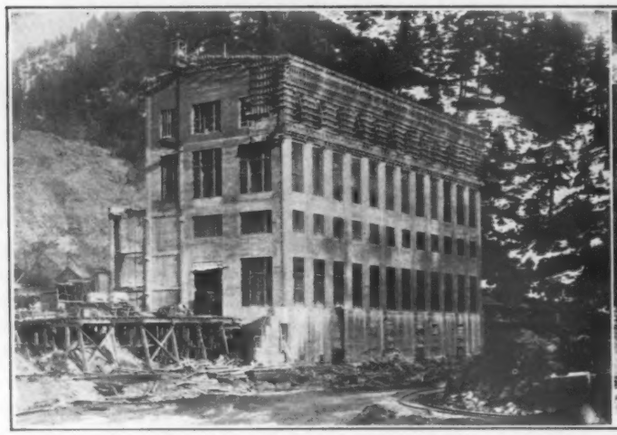
Two units are now installed, having been officially started in operation in June, 1921. Incidentally, it may be mentioned that within one month from the time the units were first turned over for drying out, the erecting superintendent had left the plant and the units were carrying full load. They have been in service continuously since their initial start and have developed in excess of 35,000 hp. under emergency conditions.

Each Generator Has Two Impulse Wheels

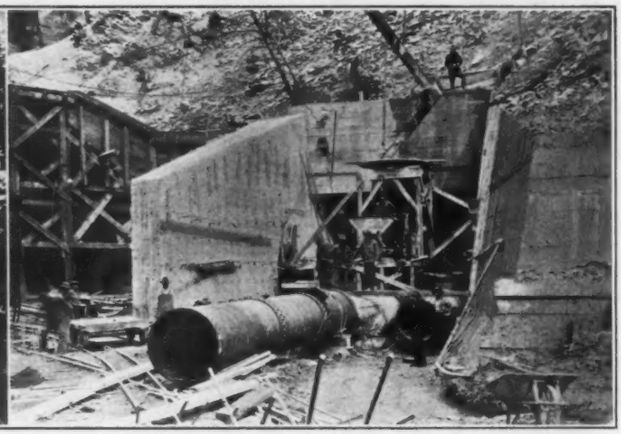
Each unit consists of a generator and two impulse wheels, one placed on each end of the shaft. These wheels are entirely independent in their action, each having its own needle control, oil pressure governor, pressure regulator and gate valve. In other words, the governors and pressure regulators are not interconnected, except that the former have their flyballs driven from the same shaft.

For by-passing the water in case of quick closure of the needle by the governor in response to a certain rejection of load, the pressure regulator is built as a governor-actuated water saving device, thus responding only to quick motion of the needle controlled by the speed governor. However, the pressure regulator is also automatically pressure operated in order to protect the pipe line against serious pressure rises produced directly in the pipe line, such as may occur when foreign matter lodges in the throat of the nozzle and partly clogs the orifice. This is effected in a very simple manner, requiring no additional device on the pressure regulator.

The two governors of each unit divide the load evenly between them, owing to the fineness of adjustment provided for permitting this division and owing to their high sensitiveness. They are not mechanically or hydraulically interconnected, each being actuated by its own flyball independently and each operating the cylinder and piston which controls the needle of the nozzle.



Construction view of the Caribou plant of the Great Western Power Company which was officially opened in June, 1921. This power house will have an ultimate capacity of 120,000 kw., in six units.



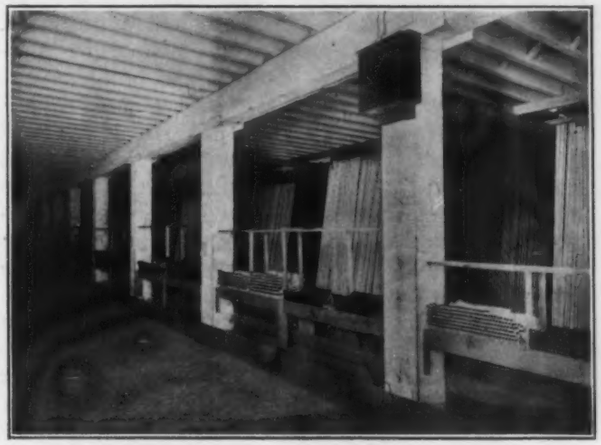
Building the penstock. The water runs through three tunnels, the entrance of the last being shown here, before emptying into individual penstocks and thence to the water wheels.

Efficient Warehousing Methods Reduce Cost of Distribution

Orderly and Convenient Arrangement of Warehouse Eliminates Errors and Enables Manufacturers' Representative to Speed Up Handling of Materials and Give Better Service

THE manufacturers' representative has long since proven his place in the chain of distribution of electrical products on the Pacific Coast. Since he does not deal directly with the consumer, nor, as a rule, maintain elaborate window displays, he is perhaps not widely known outside of the trade.

The manufacturers' representative is the salesman of the factories he represents. He is their agent on the business firing line who keeps in close touch with the jobber distributors, contractors and in some cases consumers. The manufacturer is thus assured that an uninterrupted supply of his product is reaching the consumer through the personal service and attention of his representative. The manufacturers' representative usually specializes on a few kindred lines, generally on a consignment basis, and sells in comparatively large lots to contractors and jobbers. In addition to matters of sales policy, the maintenance and storage of warehouse stocks of the various lines which he may represent is of great concern.



Material received at the warehouse can be speedily stacked in its proper bin or rack by the use of four wheel trucks.

Each bin or shelf is provided with perpetual inventory card which shows at a glance the amount of stock on hand

Orderly and convenient arrangement of merchandise in any organization speeds up the handling of commodities, insures against errors, eliminates delays, reduces costs of handling and storage, saving time and money that can be profitably used otherwise. A neat and compact arrangement of warehouse material aside from the saving in floor space and ease of taking inventory is a valuable sales aid, as the warehouse is quite often the sales room. The character of the supplies in which the manufacturers' representatives deal is frequently such that orderly and attractive storage is difficult.

A description of the unique and efficient warehousing of a difficult class of products installed by a San Francisco firm should be of interest to all dealers engaged in merchandising materials which do not ordinarily display to advantage. The institution referred to is that of Allied Industries, Inc., whose main offices and warehouse are located in San Francisco, with similar distribution facilities in Los Angeles and Seattle. This organization has combined efficient warehousing methods with excellent merchandising in the handling of such materials as conduit, wire, porcelain specialties and switches. This type of material once installed is forgotten, but it plays a major part in insuring the proper functioning of an electrical installation. It is principally the concern of the contractor and hence does not receive much consideration from the actual consumer since it does not possess the "human interest" that is embodied in the percolator, the washer, the vacuum sweeper and other household appliances. That it possesses sales possibilities beyond that ordinarily assigned it, is shown by the accompanying illustrations.

In the first illustration, thirteen carloads of pipe, elbows and fittings are shown. Observe the manner in which the stocks of galvanized and enameled conduit are arranged, graduated in sizes from ½ in. to 4 in. Directly in front of the 10-ft. lengths of conduit are to be found the necessary accessories to the proper installation of each size, all of which are arranged so as to be easily accessible. The practicability of this method is realized both in replacement of stocks as well as in the filling of orders.

The other illustration shows a model arrangement of outlet boxes, switches and porcelain specialties, packed in cartons or unit lots, arranged in accordance with the varying sizes and types, to the ultimate convenience of those who buy or sell. Sufficient room is left for the use of a four-wheel handtruck which greatly facilitates the filling of orders and the replenishing of stock.

How to Make the Electrical Cooperative Campaign a Success

Suggestions Brought Out at a Recent Meeting of the Industry in California for the Successful Operation of a Cooperative Campaign Through the Perfecting of Methods and Organization

SELLING the "spirit of the industry," that is, giving the public adequate knowledge of the platform in national, state, civic, commercial and industrial development, is the basic thought behind all cooperative campaigns, be they electrical or any other kind. With the ability of those in charge to accomplish this, rests the success or failure of any campaign. Yet before an attempt can be made to educate the public, those in charge and those members of the industry which the campaign affects must be sold the idea.

With these thoughts in mind, it is not difficult to outline a program of activities for the future, not only for the California Cooperative Campaign, but for any other of the six or more similar activities which are progressing in the West. Any program, however, should have a thorough organization for a background if it is to be successful. From advisory committee down through the various correlated committees to the campaign manager and field men, there must be cooperation. It is for the advisory committee to receive suggestions from all sources and to determine the policy and outline a program. It is for the campaign manager to see that the program is put over through the agency of his field operatives and the men of the industry who make up the many committees.

The fundamental principles behind a thorough campaign organization and a strong program, with special emphasis on the California Cooperative Electrical Campaign, might be summed up as follows:

Educating the Public: The matter of bringing home the electrical idea to the people is the fundamental idea behind a successful program if the public is to be interested in the necessity of encouraging electrical development, in the further consumption of electricity and in electrical apparatus and appliances. The program can be brought before the public through the elementary, grammar and high schools, the junior colleges, the universities, the women's clubs, the cooking schools and the civic clubs. Besides these points of contact, there are the electrical homes, the window displays and demonstrations, the education picture in the motion picture theater, the electrical film for clubs and country schools and education newspaper advertising.

Putting the Industry to Work: Proper organization of the industry itself must be perfected. One of the chief accomplishments of the campaign should be the bringing about of a closer relationship between the different branches of the electrical industry, and a better understanding of the responsibilities of each branch to the public as a whole. Cooperation of the advisory committee should be carried on to the extent agreed upon, but those in the industry assigned to individual work should be looked to for results. To hold the attention of the industry with feature subjects is the duty of the advisory committee but the carrying to completion of these subjects rests with every worker.

Organizing the Committees: With a policy agreed upon and a program outlined and divided into subjects, the advisory body should choose the committees which are to carry out each part of the campaign. Members of committees should be selected from all parts of the state and the responsibility of supervising the work in their particular section should be impressed upon the members. Publicity and encouragement should be given to the work so that those participating would at all times feel that their efforts are being recognized and appreciated.

"Get-together" Meetings: The old and well programmed "get-together" dinners are probably the most effective way of selling the campaign idea. They should be held often. They should be held in every city of the state and they should represent the entire electrical industry. As a clearing house for ideas and a generator of good will, these meetings are invaluable.

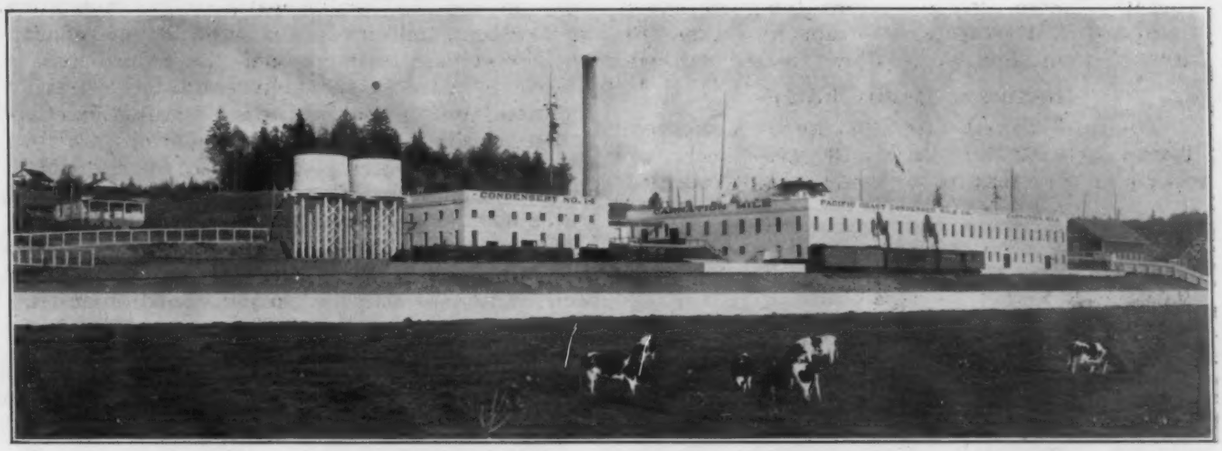
Suggestion Box: A suggestion box should be inaugurated which would serve not only as a safety valve, but also as a source of practical ideas in the conduct of the work.

Campaign Manager: The work of the campaign manager should be of an executive and not of a clerical nature. He should be in the field a large portion of the time, organizing new groups of workers and putting into effect and supervising the work outlined by the advisory committee.

Field Men: Too much dependence can be placed upon the ability of the campaign to make contact with the public through the field men, with consequent suffering. The field men should merely aid the members of the industry in bringing the campaign to the attention of the people. Like the manager, their work is largely that of organization and supervision. They should report to the manager often and to the advisory committee at least every other meeting. They should be questioned regarding any suggestions or criticisms they might have to offer regarding the campaign.

Meetings of the Advisory Committee: Too much time can be easily wasted at meetings of the advisory committee. Members should submit in writing to the manager before the meeting, a list of the subjects they wish to discuss and he in turn should assign a definite time limit to the discussions.

Convenience Outlet Campaign: A systematic check of all wiring jobs should be kept to show the proportion of convenience outlets installed in each new building compared to the number of lamp sockets. That is one of the pulses of the campaign.



The Carnation Milk Products Company has ten condenseries on the Pacific Coast all completely electrified. The electric power is used to operate sterilizers, filling machines, shakers, homogenizers, centrifugal pumps, labeling machines, can conveyors and fuel conveyors in a manner that minimizes the touch of human hands and vastly forwards economy and quality in the output.

Are You Profiting by the Economies of Electric Operation?

An Instance of What the Carnation Milk Products Company—a Truly Western Institution—is Doing in Forwarding Economy and Efficiency in Marketing a Leading Western Farm Product

By ROBERT SIBLEY
Editor, Journal of Electricity and Western Industry

So rapid and overwhelming has been the advance of electrically operated material-handling apparatus in the West that the industrial manager must constantly be alert to seize every new opportunity of cutting down costs and improving his methods of material handling if he is to keep abreast of the times.

In the West where electricity is used per capita to a degree not approached anywhere else in the world today, comparative studies of the various industries should be helpful.

The instance here cited shows what can be done in this regard in the West in the handling of milk and its preparation for shipment throughout the world. Milk is basic in the rearing of the human family and its economic preparation for shipment and service in the home constitutes a self-interest appeal common to all. This article will deal with the Chehalis plant of the Carnation Milk Products Company with headquarters at Seattle, Wash. The Chehalis plant is a local factory that pays to farmers of that community one and one-half million dollars annually and has brought to life thriving farm units in its neighborhood impossible of existence without its advent.

Preparing the Milk for Canning

The cleanliness and efficiency with which the milk is handled are quite apparent to the most casual observer visiting this factory. The milk, after being thoroughly cooled at the farm, is placed in the usual dairy cans and delivered to the factory by motor-driven trucks. At the factory these dairy cans are placed upon gravity rollers, emptied and automatically washed and steamed immediately upon delivery and returned by motor truck. Meanwhile a sample is taken of each lot delivered—an accurate test as to the sweetness of the milk having been taken—and the milk passed by gravity into storage tanks. From the storage tanks the milk is drawn off into large open copper or glass-lined kettles where it is brought to the boiling point and drawn up into condensers operating at about a 26-in. vacuum. Due to this low pressure the milk boils violently and the evaporation of the moisture in the milk is rapid. This vapor arising from the milk is drawn off and condensed by coming in contact with a spray of cold water. The milk is thus brought down to its desired consistency and cooled.

Saving in Labor Costs

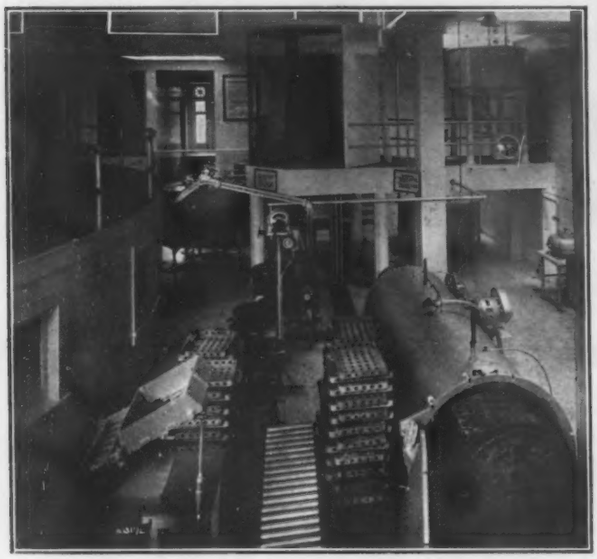
From this point on electricity plays an interesting and efficient role. Although the milk is now relieved of a large share of its former moisture, the microscope shows that butter fat contained in the milk still exists in small globules—microscopic in size—that must be broken down. By means of a 30-hp. motor the milk is forced through a series of disks with small grooved faces which under a pressure of 2000 lb. per square inch cause these globules or sacs to thoroughly break up and thus make a homogeneous content. This apparatus is known as a homogenizer.

From the homogenizer the milk is dropped over a cooling tower of pipes and its temperature lowered to about 40 deg. Fahr. Tests are then performed to insure a uniform standard and consistency. From the storage tank this standardized milk is next conducted to the electrically operated sealing machine which automatically fills and seals the cans. The

capacity of motor used to perform this work is only ½ hp., and in this one piece of apparatus alone the labor of twenty girls is saved over former methods.

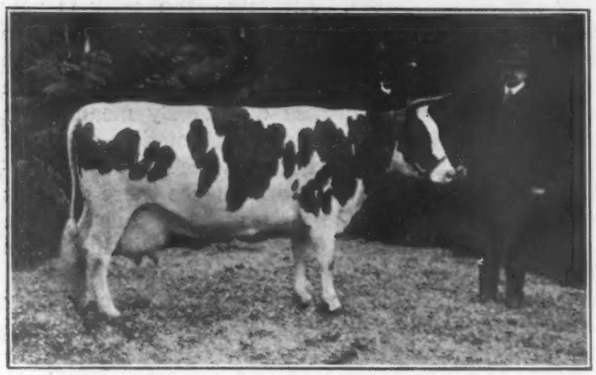
Insuring a Quality Product

The cans of milk after having been soldered, steamed and brushed electrically are checked by workers as they pass on to the electrically operated



The working model of a Carnation condensery. The coil (upper center) is a cooling coil. Below and in front of it is a filling and soldering machine. The boiler-like retort in the right foreground is a sterilizing retort and to its left are metal trays used to hold cans in the sterilizer. The large tubs on legs in the background are glass lined storage tanks.

elevators and conveying apparatus from which they are placed in metal trays of 24 cans each. Units of sixty of these metal trays are put into a large revolving retort, electrically operated, in which the canned milk is revolved under a high temperature and is thoroughly sterilized. From this retort the product is conveyed to a room heated to the most favorable temperature for development of bacteria. Each individual can is here numbered and after maturing is again tested to see that nothing but standard quality milk leaves the factory. By this careful process the company assures a safe product being



E. A. Stuart, president of the Carnation Milk Products Company, and Segis Pietertje Prospect, the world record cow. An ordinary cow will produce 3,000 to 4,000 lb. of milk per year, but Prospect, in a test lasting 365 days, produced 37,381.4 lb. of milk containing 1,448.68 lb. of butter fat. This exceeded the previous record, held by Tilly Alcarta of California by 3,950 lb. of milk and 122 lb. of butter fat.

sent out and has established a marked reputation for evenness, uniformity and reliability of product.

From these testing rooms the canned milk is placed on flat trucks and delivered to the electrically operated labeling machines where the familiar Carnation label is placed upon the cans which are then dropped into wooden boxes nailed by electrically operated machines. They are then placed upon hand trucks and quickly loaded into freight cars standing near by to convey them to the markets of the world.

This story of the electric drive in industry has been written to stir the imagination of industrial executives throughout the West to the possibility of saving from new and undreamed-of applications of electrical material-handling devices. Upon the proper solution of this problem in every industry of the West depends usually the question of dividends or no dividends. Are you using in your work the same initiative, daring, enthusiasm and constructive imagination that has enabled Mr. E. A. Stuart, the president of Carnation Milk Products Company, to become a successful international figure in his industry?

Electricity Assists in Gold Dredging

New Dredge Constructed for California Company Has Ninety-foot Vertical Digging Radius

AN electric dredge was recently built for the Marysville Dredging Company and is doing continual service in western construction projects. It has 16 cubic foot buckets arranged to dig 70 feet below the water level, and at the same time handle a bank of 20 feet above the water level. The general dimensions of the hull are as follows:

Length	155 ft., 6 in.
Width	58 ft.
Depth	11 ft., 6 in.

The digging ladder is of the solid girder type, 133 feet long and weighs 126 tons, without rollers, buckets or tumbler. The stacker ladder is 146 feet long and is of the lattice type. Its upper deck is made in the form of an inverted V, so that material spilling off the belt does not collect thereon, but drops into the pond.

The main drive motor is 400 hp., and is belted up to the main drive pulley, which is 12 feet in diameter with a 36-inch face—this is of the solid type wood construction, the same as used for stamp mills. This main drive motor also operates the main ladder hoist, there being two V type clutches permitting either, or both, to be operated at the same time. The brake bands on the ladder hoist drum are compounded off the countershaft.

The motors for the various parts of the dredge are as follows:

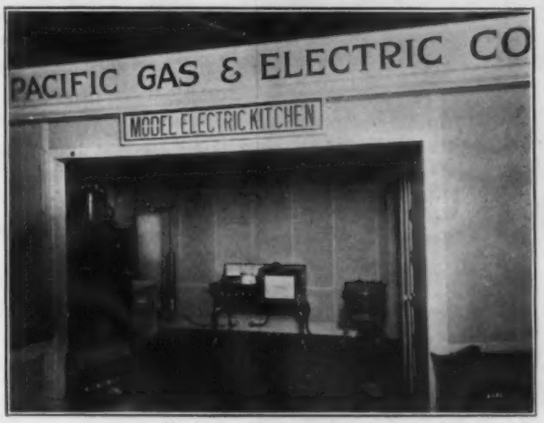
Main drive	400 hp.,	505 r.p.m.
Main winch	50 "	570 "
High pressure pump	150 "	600 "
Low pressure pump	75 "	600 "
Jet pump	50 "	1200 "
Screen drive	100 "	580 "
Stacker drive	60 "	695 "

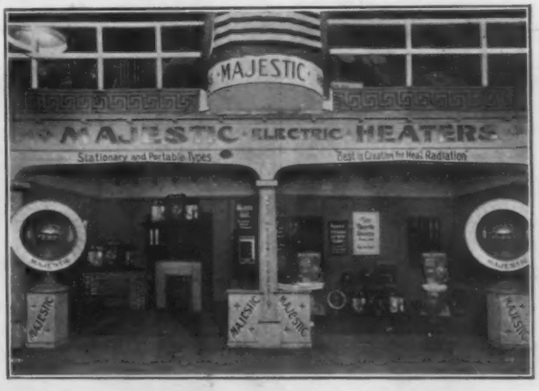
Power is brought aboard the dredge by means of 750 feet of one three conductor stranded armored cable, and is transformed by means of three 200-kw. with 4000-v. primary to 460-230-v. secondary.

Quarter Million People View Western Industry Show

One of a Pictorial Series Featuring Interesting Applications of Electric Service, Advances in Home, Industrial and Power Construction and Noteworthy Developments in Western Progress

WESTERN industrial products have been featured recently in several stupendous exhibits in various sections of the West, each of which has brought out a record attendance and much local interest. Following in the footsteps of Los Angeles, which staged an Industrial Show some months ago in the new Terminal Building, northern California industries more recently opened a still more extensive three-week display in the Civic Auditorium of San Francisco. Over 250,000 people attended the show during the period from November 19th to December 10th, paying the admission fee of twenty-five cents for the privilege of viewing these exhibits. The main floor of the auditorium was decorated with mural representations of typical western industrial scenes and effectively illuminated for night effects. Five hundred exhibitors were included in the main and auxiliary room displays.





Dominating the exhibits was the 220,000-volt steel tower erected by the Pacific Coast Steel Company in conjunction with the Pacific Gas and Electric Company, who had a demonstration of electric home appliances in its base. A loud speaking transmitter hung over the center of the area and all announcements and much of the program were made audible to all present by its use. Many electrical firms were represented with effective exhibits, prominent among them the Majestic Electric Company, one view of whose booth is here shown. The electrical contractors and dealers demonstrated electric appliances in a favored position, the Great Western Power Company displayed cost figures on the operation of electric appliances and data on company development and several local electrical manufacturers either combined or had individual booths in various sections of the floor. Several industries had exhibits following through the process of manufacture of their products, in most of which electrical operation was prominently featured.

Self Improvement in Salesmanship

A University Study Course for the Man who Meets the Public in Every Line of Business

BELIEVING that an understanding of the principles of salesmanship is the greatest need of the business world in the West at the present time, the Journal of Electricity and Western Industry announces a study course in "Self Improvement in Salesmanship" to begin in the January 1st issue. We have been fortunate in securing Professor William A. Russell, Professor of Salesmanship at the University of Washington, and one of the foremost authorities in the West in this field, to prepare this course. Professor Russell is in charge of the course in salesmanship which is being conducted by the Northwest Service League throughout Washington and Oregon and is closely in touch with the concrete needs of the merchandising branch of the electrical industry, as well as with the fundamental selling problems of all business, of which the sales department is conceded to be the most important branch.

WILLIAM A. RUSSELL

Professor of Sales Management of the College of Business Administration, University of Washington, and Educational Director for the Northwest Electrical Service League. Professor Russell is the author of a university study course on "Self Improvement in Salesmanship" which starts in the January 1st issue of the Journal of Electricity and Western Industry.

The course will consist of fourteen lessons, closely tied in with the series of lectures making up the work of the classes established by the Northwest Service League, and may be used as a text book in connection with class work or as an independent study course for those who wish to improve their sales methods by individual application.

The subject matter covered will include the salesman and the impression he makes upon the buyer, the buyer himself, the sales process, the service of selling, the sales department and the relationship between the salesman and his firm and the salesman and the community.

This service of the Journal of Electricity and Western Industry is in line with the present interest in the subject of salesmanship manifest in all parts of the West. The California Electrical Co-operative Campaign is planning active work along this line beginning with the new year and the cooperative leagues of the Intermountain district are seriously considering including this work among their major activities in the near future. In the northwest, the Northwest Electric Service League has recently organized its fifth class in salesmanship, to be held in Everett, Wash. The first class was held in Seattle and has already completed a ten weeks' course. A second was later established in Spokane during October with a twelve weeks' schedule of work. Tacoma and Portland have more recently formed similar classes, with enrollments varying from fifteen to thirty.

Not only is salesmanship training valuable in preparing new men for sales work, but the need is perhaps even greater for improving the salesmanship of those already engaged in "selling the public."

Undoubtedly the weakest point in the retail electrical industry at the present time lies in the lack of knowledge on the part of the sales force of the principles of selling.

The course is primarily designed to meet the needs of electrical contractor-dealers and their store assistants, but the principles laid down are basic and should meet the requirements of every man who comes in contact with the public. There is no line of business which does not demand some form of selling skill. Professor Russell's illuminating analysis of the subject will prove of interest to every branch of western business.

Increasing Production in Industry

Shortcuts in Management and New Power Applications That Have Reduced the Cost of Manufacturing Processes or Increased the Rate of Production. Ideas and Suggestions by Practical Men.

Incinerator for Mill Refuse Made of Brick and Concrete

An incinerator for destroying mill refuse designed for low first cost and long life has been in service at the plant of the Pacific Box Factory in San Francisco approximately two years and is reported to be wholly satisfactory. It consists of a concrete shell with fire brick lining, 14 ft. in diameter at the base and 60 ft. high, built at a cost of $6000. Thus far the capacity has not been reached by the maximum rate at which it has been possible to blow material in through the 18-in. feed pipe. As much as 400 cu. yd. of refuse have been consumed in 9 hours and it is claimed that the greater the rate of feeding the hotter the fire and hence the greater the capacity. Features of the design are the means provided for the expansion of the brick work and the arrangement of vents for cooling concrete, thus increasing the life of the structure.

Construction

The outer shell of concrete was made in two pours, each pour being made in a day. The first pour carried the structure to a height of 28 ft. and left reinforcing projecting for bond. This was the only joint as the second pour completed the structure to full height. Self-supporting forms of the ordinary type were built up on the inside and outside forms were built up independently supported by scaffolding. The only connection between the two sets of forms were the tie wires run through from side to side to prevent spreading. A 1:2:4 mix was used, delivered by a hoist in the scaffold. Dimensions and arrangement of reinforcing are shown in the accompanying illustration. Inside forms were removed in about four days, but outer forms were left in place as long as possible as a protection against wind and weather.

Brick in Two Sections

The brick lining put in after the inside forms were removed, was likewise placed in two sections, the upper section resting on a shelf in the concrete and being entirely independent of brick work below. This separation made it possible to put an expansion joint in the brick work which is said to be the most important feature of the design. The brick of the combustion chamber can expand upward without lifting the weight of the lining above, thus preventing the overloading that tends to crush or buckle the lining and shorten its life.

Heat in the combustion chamber ranges from 1500 to 2000 deg. F. and is said to cause the brick lining to expand 3 in. in a vertical direction. This movement is taken up in the expansion joint between the two sections of brick work. The clearance between the lining and the outer concrete shell is nowhere less than 1 in. and this is more than the expansion of the brick work circumferentially.

Air Vents

The concrete shell around the combustion chamber is octagonal in plan, thus affording a considerable air space between concrete and brick. Sixteen 4 x 4-in. terra-cotta vents through the concrete, just above ground level, admit cool air into this space. Heated air passes out of this space through corresponding vents near the top of the octagonal section 28 ft. above the base. In the upper circular section the one-inch space between brick and concrete is vented by one-inch galvanized pipe set in the concrete at intervals that place one vent in every 16 sq. ft. of surface.

A concave curve or corbeling-in of the brick work toward a smaller diameter throat at the top is provided which is said to improve the draft at the same time that it reflects the heat in such a way that high temperature and excellent combustion are secured. A very small quantity of ash accumulates as the draft and high temperature are such as to reduce the residue to a minimum and to carry away a part of it as very fine particles that escape in the draft. No grate bars are used, the concrete foundation at ground level being covered only with a layer of fire brick on the flat.

Combustion Controlled

A means of controlling the rate of burning and, to a certain extent, the temperature of the brick lining, is provided by four 20 x 20-in. iron doors at a height of 19 ft. above ground extending through both the concrete and brick. These doors, controlled by rods running down to a convenient height, are opened after the fire is well started and by admitting cold air near the top of the combustion chamber prevent excessive heating of the brick work. The inlets covered by these doors incline sharply upward.

Draft or suitable combustion conditions is secured by means of short tunnels at ground level, each of which has an indirect air entry by way of a pair of iron doors. These doors are held open as desired by ratchet latches and are set according to the direction of wind. At the outer end of these tunnels a wall with fire brick facing takes the direct heat from the combustion chamber, except in the case of one tunnel provided with a large end door for clean-out purposes and for convenience in passing in refuse too large to be blown in through the 18-in. pipe.

No Spark Danger

The top of the incinerator is covered with screen of ¼-in. mesh to catch sparks, and a gutter is built in the concrete around the top which can be flooded when desired. A 1½-in. galvanized water pipe runs up to this gutter and a 2-in. drain pipe leads down from its lowest point.

In applying a design of this sort where hot air is needed for some auxiliary use, such as in a dry kiln, the concrete shell could be made octagonal in cross-section all the way up to increase air volume between shell and lining. Vents to the outer air would be omitted and a blower at the base would draw the heated air into a pipe for delivery as desired.

The incinerator was designed by Captain W. W. Breite, structural engineer of San Francisco, and built by Herman Ludwig who has been granted a patent under the name of the Ludwig incinerator and hot air dry kiln.

THIS DEPARTMENT

will be devoted to a discussion of practical problems of industrial operation and management. Readers' requests for information will be published in each issue, together with the answers to previous questions. It is hoped that readers will take full advantage of this opportunity to profit by the practical experience of others and to give others the benefit of their own discoveries. Space rates will be paid for answers which are published.

Ingot yard magnet crane equipped with 20-hp. motor. Electromagnets are used for handling and transporting steel wherever possible. The magnet shown is used for stacking steel ingots each weighing 1460 lb.

Coating of Bronze Saves Painting Hudson River Bridge

How an annual saving in upkeep of $400,000 in the proposed Hudson River Bridge will be effected by means of a new and important feature of bridge construction, is described by the engineers who have prepared the plans for this colossal undertaking, as follows:

"A new and highly important feature introduced for the first time in a bridge of this great magnitude is that practically the whole of the Hudson River Bridge will be weatherproof.

"That is to say, its steel work will be so completely enclosed with rain-and-moisture-excluding bronze, that the annual cost of repainting—a most serious item in the upkeep of a big bridge—will be reduced to a minimum.

"That this little matter of protection figures in maintenance economy and is indeed vital, is realized when it is understood that it is expected to reduce the cost of painting, which, if the entire surface of the steel structure were exposed, might easily amount to $500,000 annually, and as only about 15% of the structure will be exposed to the weather, the upkeep will be reduced accordingly."

In the Hudson River Bridge there are a pair of suspension trusses or inverted arches spaced 160 ft. apart, center to center, each truss consisting of two cables from 60 to 80 ft. apart vertically, with vertical panels and diagonal bracing between to supply the stiffening under passing loads. From the two suspension trusses vertical eyebar chains are suspended, and carry the double-deck floorway.

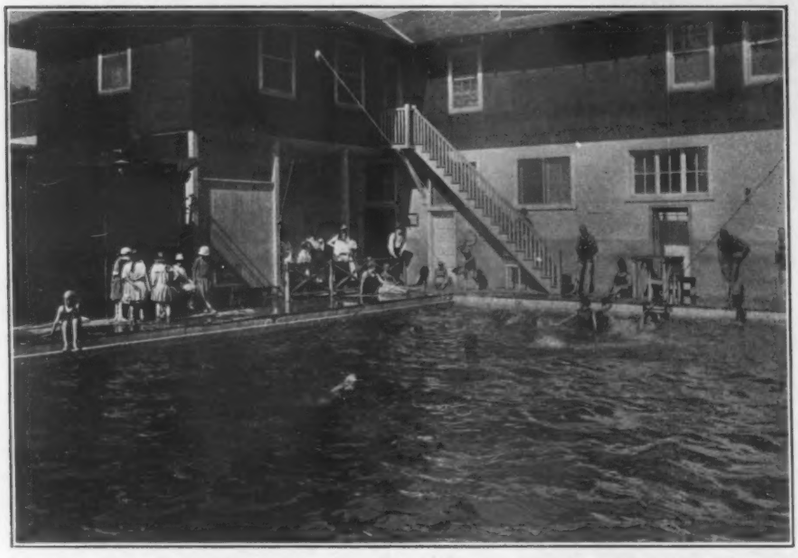
On the proper strength, functioning, and permanence of the chains depends the integrity of the bridge. Each eyebar is separated several inches from the adjacent bar, so that it can be inspected at any and all times. Each cable is enclosed in a covering or gallery of bronze for protection and to permit of inspection, so that once the eyebars are painted they will be well protected from the elements.

The chord thus assembled is eleven feet in thickness, as compared with fifteen inches for the wire cable of the Brooklyn Bridge, and with the enclosing covering is fifteen feet in external diameter.

The estimated cost of the bridge proper has been placed at $100,000,000. By the use of the bronze as a protection against the weather, a yearly saving in upkeep of more than $400,000 is expected.

Dish Washing Machines Found to Be Efficient

Replies to a questionnaire sent to several thousand restaurant owners, by "American Restaurant," regarding dish washing show that all but one-seventh of one per cent use some kind of dish washer. All different makes are used, some restaurants using more than one make. The great majority report satisfactory service, the only complaint made being the waste of water. The censensus of opinion was that the belt type of washer was best for heavy dishes and that the tank with tray type was best for fancy dishes. One-tenth of the answers indicated difficulty in obtaining dish-washing help. The answers regarding breakage were hard to analyze. In one instance a cafeteria serving 6000 people daily reported a loss of $6700 per year; another restaurant serving 400 daily reported a yearly loss of $600. Over ten per cent of the breakage results from dish washing. None of the restaurant owners reported price as a controlling factor when choosing installation. A machine that fits in a corner seemed to be preferred, and fresh water rinse was held to be essential. Breakage was reported to be reduced by the use of machines in addition to doing a more efficient job of washing. The average cost of operation of washing machines was $1.60 per 1000 dishes.



Community center swimming tank provided for employes of the California and Hawaiian Sugar Refining Corporation at their refinery located at Crockett, California. The provision of recreation facilities has long been recognized by this company as an efficient method of increasing production in industry.

Practical Suggestions for Making Disconnecting Switches

In a recent issue of the "California Safety News" published by the Industrial Accident Commission of California several methods are suggested for the construction of grounding devices to be used in cleaning or repairing electrical equipment. The report says in part:

"For circuits without much power back of them, such as the safety man will come across on the premises of industrial plants (small transformer houses or local substations receiving the high-tension power), it is easy enough to provide grounding devices that are inexpensive and safe to use. First you make a ground connection onto some nearby water pipe or otherwise. To this ground you connect either permanently or temporarily a suitable length of flexible cable which splits into three branches, one for each phase of the circuit or equipment that is to be grounded. The branches may have their free ends in the form of hooks or spring clamps or thumb screws for making contact on any available bare spots of the circuit, such as the disconnect switch or the oil switch terminals. Something more is needed, however, for the safety of the man who is applying the ground. He should not have to use his hands directly in hooking or clamping the ground into the circuit. If the circuit should be alive through mistake, there will be a flash and the man should be some distance away from it. Therefore, you should provide three switch sticks or insulated poles such as are made for operating disconnect switches. On 13,000 volts, the sticks will be about four feet long; on 66,000 volts, perhaps 10 or 12 feet long. You fasten these sticks permanently to the three ends of the grounding device and the operator takes hold of the sticks only when applying it to a circuit. In this way a man has a fighting chance of getting away from the flash that follows if a mistake is made in applying the ground. This device has the further merit of flexibility in application to two or more locations so that the protection can be applied not merely at one main bus or on one floor level, but anywhere throughout the station at the exact point where the repair work is about to be done. Other forms of grounding device have been used with practical success.

"I have been considering the grounding of circuits that have only a limited amount of power back of them. In a big central station or hydroelectric system any scheme of flexible grounding device to be applied while the operator is near by (or even in the same room) becomes almost useless from a safety standpoint or as an operating proposition. In such cases of large power when there is a short circuit resulting from any cause whatever—a breakdown of the insulation, a man getting across live parts or a misapplied grounding device—a tremendous arc develops, due to the enormous concentration of energy that is fed into the short circuit. The space becomes a seething furnace and everything that is in the path of the arc is melted down or rather directly vaporized. I will not presume to discuss this problem of limiting the destructiveness of a high-powered short circuit."

Western Dealer, Jobber and Agent

Business building suggestions for the store — Distribution and warehousing methods — Advertising and sales promotion ideas

Rocky Mountain League Issues Electric Home Booklet

Under the title of "How to Plan an Electrical Home," the Rocky Mountain Electrical Cooperative League has issued a 16-page booklet containing descriptions and drawings of the recently completed home in Salt Lake City together with a detailed wiring plan of the house with an explanation of what each outlet has been provided for. The booklets have been issued with a view of distributing them through the central stations, manufacturers' agents and contractor-dealers.

Carrying an appeal for the installation of convenience outlets, the book describes what has been done in the Salt Lake home with the fifty or more appliances which were exhibited. It emphasizes the fact that no home can be advertised as modern at the present time unless it contains such convenience outlets together with a separate circuit for power appliances such as a range, a water heater, refrigerator and similar devices which can be operated more economically at power rates.

Perhaps one of the most valuable aids for the prospective home builder which the booklet contains is a list headed "Things to be Remembered When You Wire an Electrical Home." Some of the suggestions offered follow:

In general, receptacles should be installed in the baseboards. But in certain cases there are special advantages in having them at some other height such as (1) waist high receptacles for connecting the vacuum cleaner, so that the operator will not have to stoop; (2) directly beside the serving table in the dining room; (3) beside the kitchen table; and (4) beside the tea table in the living room.

In every long hall install enough receptacles (preferably knee-high or waist-high) so that the vacuum cleaner can be used freely, without plugging into first one room and then another.

Make it a general rule to install duplex receptacles in every room, and without fail in those rooms that are provided with two or more baseboard outlets.

Be sure that the meter board is placed so that the meter can be read by the lighting company's man without entering the house.

In the laundry install a special connection for the flatiron, with a red light to show when the current is on. If ironing is to be done in the kitchen, locate a flatiron there. If there is a sewing room, another will be needed there, too. And if each ironing outlet is provided with a special fused receptacle, in case of trouble with the iron, the local fuse will blow, without disturbing the rest of the house.

Selling Electrical Appliances to the Housewife

A Series of Suggestions to the Progressive Contractor-Dealer on Merchandising Methods Applicable to Women Customers

Who buys ninety per cent of the electrical labor-saving devices used in the home? Technically it may be the man of the house who makes the purchase for it is he who lays out the money, but in almost every case it is the housewife who prompts the purchase, dictates which store is to be patronized and who chooses the appliance to be bought.

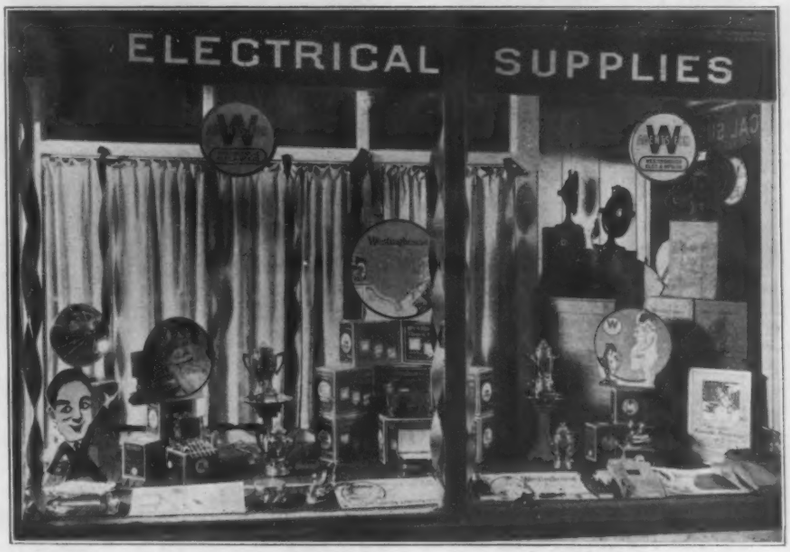
The psychology of the woman customer is foreign to the majority of the contractor-dealers who are trying to compete with department stores, hardware stores and drug stores in the sale of electrical appliances for the home. He fails to take into consideration the elements which enter into catering to the housewife. An inestimable amount of business is lost annually by the contractor-dealer who fails to keep such simple rules as having his salesroom well arranged and keeping it spick and span. He forgets that attractive furniture, cleanliness, well displayed stock, and courteous and well dressed salespeople are indispensable in appealing to the class of women who are in the market for appliances for the home.

Yet with all of these things, he may fail to draw this class of trade simply because he does not know that in selling electric appliances he is selling service. Selling an appliance which is made up of metal, wood and a cord and selling the service which this same article will render are two distinct procedures. The dealer who attempts the first will usually fail while he who follows the latter practice gets business.

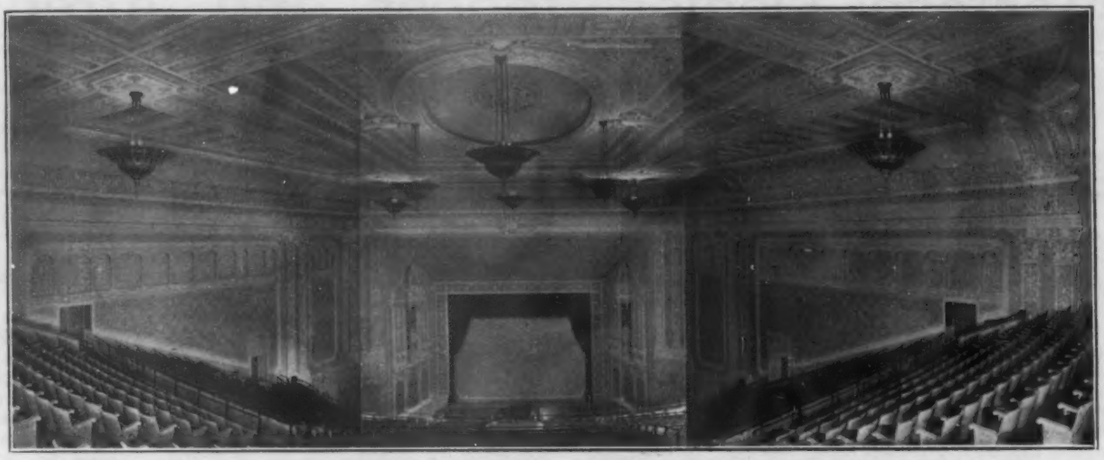
What sells a phonograph? Surely not the operating mechanism, the wooden cabinet and other material features of the machine. The enjoyment which it will bring to the home, the pleasure which will be derived from the machine and the many other humanized selling points usually clinch the sale.

The same arguments apply to selling electric labor-saving appliances to a woman. Can it not be argued that such a device will bring equal enjoyment by reducing labor at the same time furnishing comfort, convenience and cleanliness in performing a partially distasteful household task? The electrical dealer has even a greater advantage for he is selling a recognized necessity in modern living.

All women with the first instincts of good housekeeping have a strong desire for home betterment, particularly along the lines of bringing greater ease and comfort in the execution of domestic duties and consequently is the best prospect.



Many manufacturers take definite steps to aid contractor-dealers and appliance shops in carrying on a Christmas campaign. Sales literature, ideas for advertisements and plans for window displays are some of the cooperative steps which have been worked out. The Westinghouse Electric and Manufacturing Company has provided the above window suggesting gifts for each member of the household, for dealers and stores carrying the Westinghouse line of appliances.



Interior of the new $2,000,000 Granada Theater, San Francisco's latest contribution to the realm of the tenth muse.

Granada is Newest S. F. Picture Playhouse

Lighting in $2,000,000 Theater Considered Work of Art

California is the home of the tenth muse, motion picture art, and San Francisco has added the latest contribution to the realm of this same muse, the $2,000,000 Granada Theater. Electricity as the modern stage artist, as a means for marvelous lighting effects and as a means of communication throughout the building, plays an important role in this newest and most modern theater.

Experts have claimed that the lighting system in the Granada is the most perfect in any motion picture theater in America. It is a tribute to the electrical West for the fixtures and effects were designed, manufactured and installed by a western firm.

Theater lighting is a comparatively unexplored field in which the illuminating engineer may find new opportunities. It is a field but slightly developed and one containing immeasurable possibilities. The Granada Theater represents the most advanced step in this field.

Every important light in the theater has four color possibilities, amber, white, red and blue, with any combination of the four available. Every light can be dimmed down to darkness by the dimmer plates controlled by the switchboard. These plates carry a total load of 514,000 watts when every light is burning. The switchboard, the largest of its kind in any theater in the world, is of the preselective type and controls the thirty different light centers in the building. The main switchboard is located in a fireproof concrete casement in the basement but is controlled from the side of the stage.

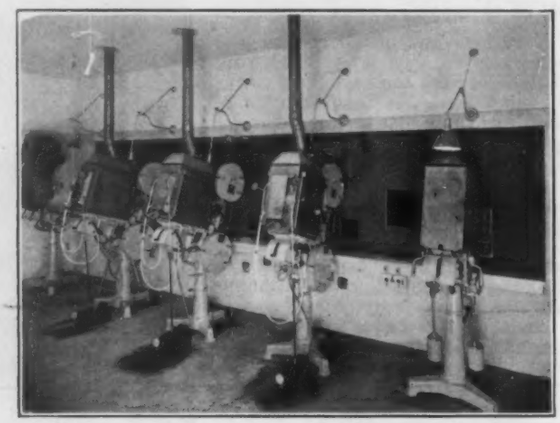
The exterior of the theater is imposing.

The stage is illuminated from above by 190 150-watt lamps with a like number for footlights. In addition there are pockets in the walls for forty-eight spot lights. Color effects can also be produced with a battery of powerful lights hidden in the proscenium arch.

In addition to the many bracket and banquet lamps throughout the theater, the main auditorium is lighted by eight colossal suspended lamps measuring seven feet across, each provided with twelve 500-watt lamps. Amber shades cover the cast iron frames of these fixtures. The balcony is lighted by six smaller suspended lamps. All of the lamps were manufactured by Thomas Day & Company, while the wiring was done by the Decker Electrical Construction Co.

Power for the building, equal to that used in four ordinary city blocks, is furnished jointly by the Pacific Gas and Electric Company and the Great Western Power Company.

The interior of the lobby of the theater is a spot of beauty. Unique architecture, ferns and exotic plants add to the attractiveness. The lighting is especially effective, producing a soft glow.



The mechanical details of the new theater are just as carefully worked out as the lighting and architecture. The interior of the projection room contains five machines, all motor operated.

Original Ideas for Boosting Appliance Sales

"How can I boost a certain appliance?" has become a common phrase among the contractor-dealers and proprietors of electrical appliance shops. Dealers throughout the country are looking for original ideas which will tend to attract attention to their stores, giving them prospects to whom the salesmen may offer selling arguments.

In front of the Renard-Stary Electrical Shop, 942 West Seventh Street, Los Angeles, there is an old sewing machine bedecked in brilliant colors and carrying a small motor attachment. On the sides are arrows pointing to a pedal on the sidewalk with the message, "Step on It." The action of the pedal starts the motor, the sewing machine at the same time stitching an endless piece of cloth. Another card invites customers inside for a demonstration.

The entire arrangement attracted the attention of hundreds of housewives, sold several motors, and secured the names of many prospective buyers, not only for the motor, but also for many other appliances.

The Electrical Appliance Store in Sacramento turned the experience of a salesman into a novel window display.

Attracting attention to a sewing machine motor in front of the Renard-Stary Electric Shop in Los Angeles. Note the convenience outlet placed directly in the sidewalk in front of the door of the establishment.

He called upon a certain housewife with the idea of demonstrating a vacuum cleaner. But the housewife attempted to forestall him with the argument:

"No use trying that sweeper on my rugs. I've just been over all of them with a broom and they are clean."

The salesman saw a real opportunity to demonstrate his sweeper to advantage. He persuaded the lady to allow him to run the sweeper over one rug, first showing her that the bag was empty. After he had finished, he carried the sweeper to the back porch where he emptied a surprising amount of dust taken from the rug onto a newspaper. The housewife was sold.

Later the sweeper, a rug and the pile of dust on a paper were placed in the window of the store, with suitable window cards telling the story, yet mentioning no names.

Problems of Good Contractor-Dealer Advertising

The Relation Between Advertising and Merchandising and a Remedy Designed to Boost Electric Appliance Sales

By W. D. MORIARTY
Field Representative, Northwest Electrical Service League

The problem of advertising is one that must be faced by every business. Just because a man does not like to work over his advertising makes no difference except to make the problem harder. The fact that he feels his advertising has never paid him merely proves that he either has not found the right answer to his problem or did not know the right answer when he got it, or lacked the salesmanship to back it up.

Advertising is a vital part of merchandising, and any man whose success depends upon salesmanship must learn how to advertise. Professional men advertise in one way and business men in another, and one of the shortcomings of the contractor-dealer has been his assumption that he could advertise effectively by personal acquaintance and the spoken testimony of those he has served. These are all very well in their way, but they are, if used alone, too slow for business.

Who Are Competitors?

The essential earmark of a competitor is that he is a man who may get money which would otherwise be spent with you. This means that the druggist and the clothier are your competitors. When people are looking for a wedding gift the jeweler is your competitor. When they are considering building all the building trades are your competitors, and such effective competitors that the electrical work is seldom that percentage of the total cost it ought to be.

Every man who has anything to sell is the competitor of every other man who has anything to sell. The mere fact that the other contractor-dealers of a town do not advertise is no reason why you need not. Your possible customers have just so much money to spend. Some of it must be spent for necessities, and electricity is one of these necessities. This is why some electrical dealers get what little business they do get. People just must have certain electrical conveniences and they must buy them somewhere. But a very large percentage of what people buy is after all a matter of choice, and the real reason why the electrical business is not double what it is lies in the fact that the men in the business are not on the job making people want more electrical conveniences. If they want them badly enough they will get them even if they have to do without something else.

Of course much money is wasted in advertising. No one denies it. But no money is wasted in intelligent advertising. This is not written to persuade men to spend money in advertising but to get them thinking how they can spend it to advantage.

Money Wasting Advertisements

The curse of advertising in this business and most others is that it is not bought but sold. Someone comes around and sells you advertising space, but advertising space is not advertising. It becomes advertising only when you put something in it which helps you sell goods. Moreover, when you think of advertising you should remember that you are a business man, not a doctor or a lawyer. It may be all right for a doctor to spend his money for a so-called "card" in a paper which reads:

"JOHN JONES, M.D.
General Practitioner
Specialist in Diseases of Children."

The ethics of his profession forbid his really going after business the way a business man does. But there is no excuse for you wasting money buying space to fill it up with

"JOHN SMITH
Everything Electrical
Sole Agent for the Hoorah Washing Machine."

You buy space intelligently only if you fill it intelligently.

Representative Advertising

Once bought, advertising space must be filled. Much good copy is sent out by manufacturers but unless the advertisement fits the dealer or the dealer is willing to build sales talks around the advertisement the real purpose of advertising is not fulfilled.

Any dealer who is a credit to the business knows for what his store stands, and he ought to be able to speak convincingly on the subject to old customers and to hoped-for customers. It may take some practice,but if he sincerely tries to tell his customers something which is really true and to their interest, he will find his task growing easier.

This does not mean that the dealer must himself write his own advertisements, but it does mean that they must be written by someone thoroughly in sympathy with the ideals of his store. It should be added also that it is manifestly foolish to spend ten dollars for space and not fifty cents' worth of intelligence in filling it. If a man were sending out five hundred copies of one letter he would surely have sense enough to spend some time in writing that letter, in fact, direct-mail advertising is one of the best forms of advertising the contractor-dealer can use, largely because he puts some intelligence into it, far more than he puts into an advertisement which will reach many times the number of people. And yet the advertisement should have more intelligence put into it for it reaches a man, so to speak, in the same envelope with the advertisements of all your competitors.

EDITOR'S NOTE

This is the first of a series of articles on advertising as applied to the contractor-dealer establishment and electric appliance shop to be written by Mr. Moriarty. The second article will appear in an early issue of the Journal of Electricity and Western Industry.

Activities of the West

A Business Man's Department Devoted to Events and Developments in Western Industrial Centers—Including News of Interest to Readers in Public Utility, Industrial and Trade Fields

Industry Building is Planned

Portland Architects Enlist Electragists in New Movement

The Portland chapter of the American Institute of Architects called a meeting on November 14 in the architects' hall which was attended by delegates from all branches of the building industry. The purpose of the meeting was to start a movement for the erection of a building which will house the various associations and organizations interested in the building industry in the city. After a thorough discussion a committee was appointed composed of the chairmen of the various organizations to formulate a definite plan of action.

It is hoped to have a building in which the headquarters and display rooms of the architects, electrical contractors and dealers, plumbers, heating contractors, general contractors, building material dealers, lumbermen, painting, plastering and bricklaying contractors may be maintained. Provision will also be made to accommodate the various engineering and technical organizations of the city. A large assembly hall for joint meetings, dances and entertainments, club rooms, a library and a gymnasium would be features of the building. A. E. McCoy, chairman of the first district of the Oregon Association of Electrical Contractors and Dealers, is the representative of this organization on the building committee.

Tacoma Loses Fight for Land for Power Project

The city of Tacoma recently lost its fight in the Superior Court of Pierce county to secure state land needed by the city to complete its holdings for the proposed 100,000-hp. Lake Cushman development, to supply power and light for the city needs. The land required is held for development of fish hatcheries, and the State Board of Fisheries has opposed the city's right to condemn the property involved, alleging that the north fork of the Skokomish, which is the property involved, is more valuable to the public for fish spawning than for developing electrical energy.

Judge G. S. Wright, of the Superior Court, handed down a decision to the effect that the land held for development of fish hatcheries can "no more be condemned than the state capitol building." The city of Tacoma has acquired virtually all of the remaining land needed for its power site development, after six months of condemnation proceedings in Mason county courts, and the opposition of the State Fisheries Board has come as a complete surprise. The city of Tacoma is now preparing its appeal from the decision of the Superior Court.

Suggest Electricity as Prison Guard

High tension wires strung along the walls of the Utah state prison as a means of preventing the escape of prisoners in the future has been suggested by the state board of corrections in their recommendations to the board of finance asking for funds to replace the antiquated wiring system of the prison with an up-to-date system. The plan calls for the stringing of wires carrying 2000 volts along the prison walls. The wires will be connected to an alarm system so that any attempt to cut them would set a series of gongs in operation.

Doherty Company Applies for Power Permit in Colorado

Indications that the Doherty interests are planning further developments in Colorado are contained in an application to the Federal Power Commission for a preliminary permit to build a dam on the Grand River, near Kremmling, Colo. The permit is asked for in the name of W. J. Barker, president of the Denver Gas and Electric Light Company, a Doherty corporation. The fact that Denver officials of the company deny all knowledge of the permit and state that the company has planned no development, is taken by local interests as an indication that the application came from the New York offices of the holding company.

The application shows that the proposed dam would be 230 feet high and would create a reservoir impounding 1,000,000 acre-feet of water. The power plant to be erected in conjunction with the dam would generate 65,000 horsepower.

Spokane Has Highly Successful Electrical Show

Added stimulation to the electrical industry in the Northwest, especially in the matter of bringing before the public the "Electrical Christmas" idea, was given by an Electric Show held in Tacoma from December 5 to 11. Sponsored by the Northwest Electrical Service League, with R. G. Emerson, field representative in charge, the show has been declared highly successful. A miniature electric home with each room completely furnished with the necessary appliances was one of the features of the show. The committee in charge of the display consisted of the following: H. T. Whitehouse of the Washington Electric Supply Co., C. V. Aspinwall of the Westinghouse Electric and Manufacturing Co., R. C. Steeple of the Doerr-Mitchell Co., W. J. Currie of the Washington Water Power Co., and H. C. Swann, city electrical inspector.

S. F. Manufactures Increase

Census Figures Show Large Increase in Value of Products

Power used by San Francisco manufacturing firms during the year 1919 increased 61.4 per cent over the amount used in 1914, according to figures just released by the United States Census Bureau in connection with the 1920 census. During 1919 a total of 99,748 primary horsepower was utilized in the plants.

Similarly the census figures show that the capital invested in manufacturing increased 124.1 per cent over the same five-year period with a total of $326,398,000 invested in 1919. The value of the manufactured products increased 157.1 per cent.

In explaining the figures, the census report states that only plants operated under the so-called "factory system" were included in the data, while the number of establishments reported does not include the actual number of plants, but the individuals or corporations owning or operating such plants.

The figures for the year 1919, together with the percentage of increase over 1914, follow:

Number of establishments	2,360	1.1
Persons engaged in manufactures	61,328	45.7
Proprietors and firm heads	2,451	16.4
Salaried employes	10,287	39.0
Wage earners	48,590	53.0
Primary horsepower	99,748	61.4
Capital	$326,398,000	124.1
Services	78,621,000	122.2
Salaries	18,917,000	87.4
Wages	59,704,000	136.1
Materials	261,418,000	169.4
Value of products	417,321,000	157.0
Value added by manufacture (value of products less cost of materials)	155,903,000	138.9

San Diego Company to Issue Monthly Publication

The San Diego Consolidated Gas and Electric Company has instituted a company magazine, to be known as "Glow," the first regular issue of which appeared December first. The purpose of the periodical is to present to the employes educational and entertaining articles regarding the business, social and sports activities throughout the company's organization. The December issue contains an article on the growth of the company since its organization, written by R. C. Cavell, superintendent of the record department and managing editor of the publication. The article points out that the company represents an outlay of $14,500,000, has 701 employes and is San Diego's largest industrial development. The publication will be issued monthly.

Officials Declare for Federal Colorado Development

San Diego Conference Brings Out Government Plan when League of Southwest Sessions Fail to Reach Agreement

Following three days of papers and discussions on the possibilities of the Colorado River, both for irrigation and power development, and the various methods of financing and controlling such a development, the meeting of the League of the Southwest at Riverside, Cal., adjourned without expressing any sentiment on the question, either in the form of resolutions or a vote.

It was expected that the representatives of the seven states most vitally affected would express some definite opinion on the matter of developing the river before the formal hearing before the Federal Power Commission at San Diego which opened on December 12, but no action was taken.

Failure to pass resolutions is blamed on a spirited debate between state delegations as to how the vote should be taken. Representatives from Colorado, Utah, New Mexico, Arizona and Nevada held that the vote should be taken by states, each state having one vote. The California delegation, by far the largest, refused to sanction this procedure, holding out for a vote by membership. Attempts to bring about a compromise, both in the ranks of the California delegation and between the various states, failed and the meeting adjourned.

The question of the development of the vast water and power resources of the river were presented from every angle by experts well qualified to discuss the various problems. Private, municipal, state, interstate and national development were discussed.

Every problem attendant upon such a development was presented at some time during the three-day session, and the topics of the various papers and addresses ranged from flood control to financing.

Secretary of the Interior Albert Fall, representing President Harding, was one of the principal speakers. Secretary Fall stated that the government intended to iron out the difficulties between the various parties concerned as speedily as possible so that the vast acreage of undeveloped land may be placed at the disposal of the veterans of the World War.

R. T. Jeffery, chief engineer of the Hydroelectrical Power Commission of Ontario, perhaps aroused the greatest comment with his description of what that province has done in the way of public development and distribution of power. Representatives of each of the seven states presented the problems of their state regarding the projects which have been proposed. R. D. McPherrin of the Imperial Irrigation District, and one of the pioneers in the irrigation field, appealed for immediate development which would in some measure mitigate the dangers from flood which have cost millions of dollars in the past.

R. H. Ballard, vice-president of the Southern California Edison Company, told the gathering that his company stood ready to expend $40,000,000 annually in the development of the power and irrigation resources of the river, while David T. Babcock, representing the Investment Bankers Association of America, stated that his association stood ready to underwrite any private corporation or municipality which might be sanctioned by the Federal Power Commission to proceed with the project.

The sessions were presided over by Dr. R. B. von KlienSmid, president of the University of Arizona, and president-elect of the University of Southern California.

O. C. Merrill, executive secretary of the Federal Power Commission, in his address on "Power and the Colorado River," gave a clear and concise review of the present situation together with the various possibilities for power development which the river affords. He said in part:

"In its length of 1700 miles the Colorado extends from the permanent snowfields of the Rocky Mountains to the sub-tropical lands of the Imperial Valley. Within its basin are five million acres of irrigable land. The volume of its waters is exceeded only by the Sacramento, the Columbia, and the Mississippi. Along its course it would be possible to develop more than 6,000,000 water horsepower—two-thirds as much as is developed in the entire United States today. The problems of the Colorado affect seven of the states of the United States and two of the states of Mexico. All of these states are vitally interested in the distribution of its waters for irrigation and in the utilization of its potential water powers, while many millions of dollars of property values in both upper and lower California are periodically menaced by its floods.

"A discussion of the general problems of the Colorado may best be undertaken if we first consider the river in three sections, and then the relation of these sections to each other. The upper section from the headwaters to the mouth of the San Juan comprises about 40 per cent of the area of the basin and affords about 87 per cent of the total runoff, or an average of 15,000,000 acre-feet per annum. In this section are some 2,500,000 acres of irrigable land, one-half of the total in the basin. It also has power possibilities aggregating 2,000,000 horsepower. In this section, both upon the main stream and upon its tributaries, are many favorable reservoir sites by means of which it would be practicable to regulate the flow of the streams for irrigation within the section, for power development both within the section and outside, and, if desirable, for flood control on the lower river.

"The middle section from the mouth of the San Juan to the mouth of the Williams comprises about 35 per cent of the area of the basin and supplies about 7 per cent of the annual runoff. There are no irrigable lands along the river in this section and only 250,000 acres on the tributaries, none of which can be reached from the main river. In this section, however, there is a total drop of some 3,000 feet, capable, if fully utilizing the average annual runoff entering the section, of producing 4,000,000 horsepower. Except for the Boulder Canyon site near the lower end of the section there appear to be no feasible storage sites. Dams erected for power development would be primarily for the purpose of concentrating the head and of providing daily load regulation. Seasonal regulation would be dependent upon storage in the upper section.

"The lower section from the mouth of the Williams River to the Gulf and including the drainage of the Gila and the Imperial and Coachella valleys in California, comprises some 25 per cent of the total area of the basin and furnishes about 6 per cent of the average annual runoff. Its power possibilities are relatively unimportant, but it contains some 2,250,000 acres of irrigable land, the most fertile and most valuable in the basin, a large part of which is periodically endangered by floods.

"Viewed solely from the physical standpoint, the upper section of the basin might have its primary development directed either toward irrigation or toward water power. On the other hand, the middle section, with the exception of storage below the mouth of the Virgin and of relatively small irrigable areas on the tributaries, is suitable only for power development. Equally clearly the lower section should be devoted primarily if not exclusively to irrigation."

Several resolutions had been prepared by the special committee appointed for that purpose and had been passed and were ready for presentation to the general meeting when that body adjourned. Included in these resolutions were the following:

"Resolved, Pending the decision of the Interstate Compact Commission, that in all licenses or permits issued by the Federal government to authorize the construction or maintenance of dams, ditches, reservoirs or other physical works upon the public domain, there should be a provision whereby the holder agrees that the use of water in connection therewith, from an inter-state stream, shall be subject to the right of each other state upon such stream to an equitable division or portion of such water for itself or its people, whether water uses in other states have been made already or made thereafter; and that where the Federal government itself undertakes water projects taking water from such a stream, there should be in the statutes and regulations appropriating money therefor and authorizing the project and in all water contracts made in respect thereto, a similar provision; and that where water projects exist in one state upon an inter-state stream, whether they be projects of the Federal government or not, the Federal government should not on the ground of interference with the water system of such projects hold up projects in other states by refusing to grant rights of way therefor upon the public domain.

"Be It Resolved, That we earnestly recommend the immediate and comprehensive development of the entire Colorado River basin, with due regard to the necessities for prompt flood control, to the end that millions of dollars of present property investments may be safeguarded; millions of arid acres of land shall be reclaimed and brought into productivity for the benefit of the entire nation; and full development of hydroelectric power may be obtained for the upbuilding of the varied industries of the several states."

Government Offers Colorado Plan at San Diego

Included in the plan for the immediate development of the Colorado River as outlined by Secretary of the Interior Fall and Arthur P. Davis, director of the U. S. Reclamation Service, at the San Diego hearing are the following:

That the government immediately construct a dam at the Boulder Canyon site for the primary purpose of flood control, with irrigation the second consideration and power generation last.

That the cost of the construction of this dam with interest be repaid in full to the government by the sale of power.

That power, irrigation and other benefits be allocated by a board composed of one irrigation engineer, one irrigation lawyer and one power engineer, all to be chosen from a district outside the interested area.

The above plan received the unanimous support of all of the four hundred or more officials and others who attended the hearing with the exception of the representatives of the Southern California Edison Company, the Southern Sierras Power Company and the states in the upper Colorado basin. The latter asked assurance that their rights would not be jeopardized by the construction of such a dam, prior to the use of water farther up the stream.

The power company representatives, speaking through R. H. Ballard, vice-president and general manager of the Southern California Edison Company, declared that in their applications for a license they recognized the prior right of flood control and irrigation, that they were agreeable to the proposition that the license when issued, specifically state that no preferential rights be conferred which might operate against the upper basin, and that they recognize the principle that the state in which the power is generated be given first rights to its use. Mr. Ballard also declared that the Edison company was ready to issue bonds to cover two-thirds of the cost and stock to cover one-third and was ready to proceed with the work to the extent of thirty or forty millions of dollars annually.

Link River Dam Turned Over to Government by Builders

The Link River Dam, built to regulate the flow of water between Upper and Lower Klamath lakes, was recently completed and turned over to the United States government. The dam was constructed by the California Oregon Power Company under contract with the United States government through the Reclamation Service of the Department of the Interior, and is a part of the government's plan for the full development of the Klamath irrigation project and the full utilization of the Klamath watershed. From the company's point of view the dam may be used to create a steady flow down the Klamath River and thus prevent the waste of water which hitherto has always occurred during the high-water season.

As is widely known, physical difficulties were not the only problem that confronted the builders of this invaluable asset to the region. Through a misunderstanding of the contract, considerable opposition to the contemplated work arose locally, and halted the work in 1920. But after a thorough investigation on the part of the Chamber of Commerce of Klamath county, and the Department of the Interior in Washington, and after a supplemental contract had been entered into doing away with the previous objections, activities were resumed in May of this year.

Credit for the final completion of this engineering accomplishment belongs jointly to the local Copco organization and to the members of the contracting firm of Duncanson and Harrelson. The construction work, most of which was done during the past summer, was superintended by William Harrelson, his brother, D. O. Harrelson, Jr., and their superintendent, Victor Storm.

Until the construction of this dam, the flow of the Link River, at the outlet of Upper Klamath Lake, was controlled by two natural weirs or reefs. Briefly, the work of the company was to remove a portion of each of these reefs and construct a dam with a variable crest. The dam is located below the second reef at the head of the Keno Canal and just above the natural rapids in the Link River from which the city of Klamath Falls derives its name.

The Link River dam, which is in reality a series of piers raised on a foundation of tight bedrock seven feet below the natural stream bed, is a structure of reinforced concrete and measures 435 feet between abutments with an average heat of twenty feet. The dam diverts water for the irrigation of large tracts of land which will comprise a federal land settlement.

INDEX READY

The index for Volume 47, June to December, 1921, is now on the press. It will be sent upon request to any subscriber free of charge.

Wireless Telephone Astounds People of China

The marvels of the wireless telephone have taken the Orient by storm, according to Professor C. H. Robertson, American lecturer, who has been demonstrating the latest developments of electricity throughout China and Japan during the past six months. On the first day that he puzzled the Celestials of Shanghai by carrying on an intelligible conversation with some mysterious individual in empty space, it was estimated that more than 14,700 natives came to witness the performance. Before he had left the city his lectures on the wireless 'phone had been attended by an aggregate of at least 300,000 people.

Professor Robertson, who is being aided in his work by the China Electric Company, an allied company of the International Western Electric Company of New York, found that the easiest way of interesting the Asiatics was to take his wireless telephone station through the streets of the crowded cities on a big Chinese weelbarrow. Every now and then he halted and carried on a wireless talk with his associates who had set up another station in their quarters.

Protest Moving Water Rights Office from S. F.

Several San Francisco organizations, including the local section of the American Society of Civil Engineers and the Electrical Development League, have protested to Governor William D. Stephens against the removal from San Francisco of the division of water rights of the State Department of Public Works. The move has resulted in the deposition of Charles H. Lee in charge of the office by A. B. Fletcher, head of the department, and the appointment of Paul Bailey to succeed him. Mr. Bailey was formerly in charge of the water resources investigation and has held various appointments in the Department of Public Works.

The California Oregon Power Company, which operates in northern California and southern Oregon, will move its main offices from San Francisco to Medford, Oregon, on December 21. The company has a large hydroelectric plant at Klamath Falls.

Plans for Skagit River Power Machinery Approved

Drawings of the hydroelectric machinery to be furnished the city of Seattle for use in the main power house on the Skagit River development project were recently received and found satisfactory by C. F. Uhden, hydroelectric engineer in charge of the Skagit work for the city of Seattle. The drawings were submitted by the Westinghouse Electric & Manufacturing Company, and covered two Westinghouse generators of 30,000 kva. capacity each, and six transformers of 10,000 kva. each.

The S. Morgan Smith Company of York, Pa., submitted plans for two huge hydroelectric turbines. In addition to the turbines, the Smith Company will also furnish the three big hydraulic valves, 10 ft. in diameter, which will be required. The machinery covered in the drawings will cost the city approximately $1,000,000. Delivery will begin in January, 1923, and is to be completed in May, 1923, or sooner if construction work on the Gorge Creek power house has reached a point that will warrant quicker delivery.

Alaska Pulpwood Tract Placed on Market by U. S.

Two billion feet of Alaska pulpwood, the largest amount of National Forest timber ever offered for sale, has been placed on the market by the Forest Service. The timber is within the Tongass National Forest on Admiralty Island and comprises 90,000 acres with a frontage on navigable water of 48 miles. Four-fifths of the timber is Western hemlock and the remainder Sitka spruce, both of which make an excellent grade of paper. The sale period has been set at thirty years and the sales contract calls for the erection of a pulp manufacturing plant with a capacity of 100 tons daily, to be established in Alaska within three years after the purchase of the timber. The prospectus describing the land states that there are many unappropriated power sites adjacent to the tract of timber, suitable for developing sufficient power for a large pulp and paper mill. Recent surveys show that sufficient timber is available in the far northern territory to supply one-third of the present newsprint requirements.

Engineers of the Department of Public Works at Olympia are carrying on an investigation for the department of conservation and development to determine the possibilities of development of electrical power in connection with the White-Bluffs-Hanford Soldier Land Settlement project.

The Link River Dam between Upper and Lower Klamath Lakes, built by the California Oregon Power Company for the U. S. Reclamation Service.

Tacoma Church Has Electrical Heating System Installed

The new Holy Rosary Church just dedicated in Tacoma, Washington, has an unusual adaptation of electric heat. The building cost $200,000, and has a seating capacity of about 900. While the building is not entirely completed, the new heating system gave satisfactory service on the day of the dedication, under adverse conditions.

The plant consists of one main steam generator,—a steam drum, connected with which are three 26.8-kw. improved electric steam units. These units are designed for 220-240-volt circuit. This generator has an evaporation capacity of about 32 gallons of water per hour. The heat is distributed through mains running beneath the floor, which feed a loop of steam coils under each pew, giving an even distribution of heat to the 310,000 cubic feet of air in the building.

Another feature of this system is that it is designed to heat the two school buildings connected with the church, using the same units, as the school buildings seldom if ever need the heat at the same time as the church building.

According to A. J. Holmes, the inventor of the system, the cost of operation is approximately forty cents per hour for the entire unit. Tacoma's power rate is but half a cent per kw-hr.

Work on Pit River Project of P. G. & E. Progressing

Progress on the Pit River development of the Pacific Gas and Electric Company indicates that the project will be completed at approximately the date set when the undertaking was proposed, according to reports from officials of the company. A progress report for the entire work up to the middle of the month of November shows that the project stood thus:

Two power plants on Hat Creek completed and in operation, each of 16,500-horsepower capacity.

Pit River No. 1 development in active process of construction, with the excavation for the diversion dam on Fall River half completed, the 1200-ft. canal from intake to tunnel mouth 85 per cent dug, the 10,180-ft. tunnel that will carry the water from Fall River Valley to the canyon of the pit 86 per cent driven.

The foundation for Pit No. 1 power house poured and the 1200-ft. tail race from power house to the river 75 per cent excavated.

The pole line from Hat Creek to Cottonwood, distance about 60 miles, completed. Forty miles of the double-circuit steel tower transmission line from Cottonwood to the company's new substation in process of construction near Vacaville and the tower foundations laid for the balance of the distance.

A $5,000,000 steel plant and rolling mills is to be located at San Diego, Cal., if plans proposed by A. P. Gilles, San Francisco industrial engineer, mature. Mr. Gilles has secured a large deposit of iron ore near San Diego and plans to erect a mill having a capacity of 200 tons daily. It is estimated that the plant will require 25,000 horsepower for its operation.

The new home of the Baker-Joslyn Company in Seattle provides 18,000 square feet of floor space for handling the large stock of transmission line material and other electrical equipment which the company handles, as well as presenting an imposing appearance from the exterior.

Baker-Joslyn Company Purchases Seattle Headquarters

The Baker-Joslyn Company, jobbers of Seattle, San Francisco and Los Angeles, has purchased the office and warehouse building of the Northwest Trading Company at 2424 First Avenue, Seattle, which will be used as the Northwest distributing headquarters.

The building is 60 by 150 feet, with one floor and basement and 18,000 square feet of floor space. Spacious offices occupy the front of the ground floor while the remainder has been especially constructed for warehouse use. The 20-ft. clearance on the main floor provides for the future construction of a mezzanine floor which will add 5000 square feet of floor space to the present capacity.

The Seattle branch was established seven years ago and for the past six years has been under the management of H. H. Manny. The company is the Pacific Coast distributing agency for pole line construction materials and electrical equipment of the Joslyn Manufacturing and Supply Company of Chicago, and other construction material manufacturers.

The Baker-Joslyn Company is the second large electrical supply house to purchase a permanent home in Seattle, the Westinghouse Electric and Manufacturing Company having recently bought the plant of the Kilbourne-Clark Company.

Western Reclamation Interests Meet in Salt Lake

Governors of Thirteen States Send Message to President Harding Endorsing Reclamation of Waste Areas of the West

The convention of the Western States Reclamation Association was held at Salt Lake City, Utah, November 29 and 30. Delegates were in attendance from Idaho, Arizona, New Mexico, Utah, Nevada, California, Oregon, Washington, Colorado, Wyoming, Nebraska, Montana and Texas. Among the delegates present were governors of several of the western states, including the following: Governor D. W. Davis of Idaho, Governor Chas. E. Mabey of Utah, Governor Thomas E. Campbell of Arizona, Governor M. C. Meecham of New Mexico, and Governor Dixon of Montana.

Governor D. W. Davis, president of the association, in speaking before the convention, declared that the West should grasp the opportunity to capitalize the unemployment situation by pushing reclamation plans that will provide homes for former service men and work for the army of unemployed. Governor Davis referred to the Smith-McNary bill, and declared his belief that the cause of reclamation is ably supported in Congress, and that the Smith-McNary bill is strongly constructed.

At the second day's session Governor D. W. Davis of Idaho was unanimously selected as head of the association, succeeding himself. Apostle George Albert Smith of Utah was named as vice-president, succeeding W. W. McDowell, formerly lieutenant-governor of Montana. A vote of appreciation of the active work of Frank W. Brown as secretary of the association virtually directed the retention of Mr. Brown in that office. W. W. Armstrong of Utah was selected as treasurer of the association.

Executive committee members include the governors of each state, ex officio, and the following:

Utah, W. R. Wallace; California, W. A. Beard; Oregon, Whitney L. Boise; Washington, D. A. Scott; Idaho, R. A. Shepherd; Nevada, to be filled in later; Arizona, P. D. Overfield; New Mexico, F. G. Tracey; Colorado, F. L. Lucas; Wyoming, F. C. Emerson; Montana, W. T. Cowan; Nebraska, J. L. Whitehead; Texas, C. H. Pease.

The association endorsed the principles of the Smith-McNary bill, and sent the following telegram to President Harding:

"The Western States Reclamation Association, representing thirteen western states assembled at the call of the governors of such states, declare it the part of wise statesmanship and far-seeing economic policy that the development of the waste lands by irrigation and drainage be undertaken by the federal government.

"Reclamation of 20,000,000 available acres of irrigable land in the West is desirable if this great empire is to take its rightful place in the nation as an economic and social factor in the program of reconstruction now before the nation.

"We respectfully request that you renew your endorsement of the cause of reclamation by including in your message to the Congress of the United States a recommendation that a broad national program of development be undertaken."

Western Cooperative Campaigns Feature Christmas

Three western cooperative campaigns are waging vigorous drives to bring home to the people the advisability of purchasing electrical gifts for Christmas. In California, the cooperative campaign besides emphasizing electrical week from December 5 to 10, have arranged a contest with the San Francisco Bulletin, while the Rocky Mountain League sponsored a special electrical section in the Salt Lake Telegram. The Denver League is conducting a special cooperative advertising campaign in addition to the regular electrical week.

The California League, through the San Francisco Bulletin, is conducting an essay prize on "Why Electricity is the Modern Servant in the American Household." Electrical prizes ranging from ten small flashlights to a range or washing machine have been donated by the contractor-dealers. The essays will be judged and prizes awarded shortly after Christmas.

In Salt Lake the league is fostering a contest in which prizes are awarded to people who present the greatest number of sale tags from stores which are members of the league. Twelve prizes are offered in this contest while three additional prizes are offered to the person presenting the largest single sales tag representing a purchase during the Christmas shopping period. Salt Lake has also followed the lead of Denver in issuing an attractive gift certificate.

During Electrical Week in Denver nearly every retail electrical dealer in the city arranged special window and floor displays in their stores. Novel effects were obtained through seasonable color schemes, and special "stunts" accompanying the demonstration of various appliances attracted unusual attention.

Newspaper advertising in the cooperative campaign now being carried on started the "Electrical Christmas" story about December 1st and during Electrical Week the League's Christmas poster was reproduced in every paper every day. A number of the jobbers and dealers used "tie-in" copy to advantage, it is reported.

The gift certificate idea was loudly acclaimed by the entire industry and although only the retail dealers are issuing them, the other members are backing the proposition to the limit. The League, through its advertising agency, prepared an attractive certificate in two colors, with window streamers accompanying it, the use of which thus far is believed by the League officers to indicate unusual effectiveness as a sales aid.

Electrical Association Formed in Victoria, B. C.

Under the auspices of the Electrical Service League of British Columbia, the electrical industry of Victoria, B. C., has organized the Victoria, B. C., Electrical Association. The organization was completed Nov. 24, 1921, when the various representatives of the central stations, the manufacturers and jobbers and the contractor-dealers met in the offices of the B. C. Electric Railway Company, Ltd.

In the constitution which was adopted the following are set down as objects of the organization:—

(a) To develop the electrical industry by educational methods, encouraging the practice of good ethical business methods and of improved service to the public.

(b) To develop a closer cooperation and understanding between central stations, contractor-dealers, manufacturers and jobbers to the end that the efficiency of the various branches of the industry serving the public may be increased and that the customer may obtain better electrical service.

(c) To help the contractor-dealers improve their business methods, including accounting, sales advertising and general store appearance, thereby elevating the plane of the retail branch of the industry.

(d) To form a recognized body to promote electrical development to support each branch of the industry when occasion requires and obtain fair treatment for invested capital on the part of the authorities by working for a fair attitude towards electrical development on the part of the public at large.

The following officers were elected for the ensuing year:

A. T. Goward, manager, B. C. Electric Railway Co., Ltd., honorary president.

S. J. Halls, sales engineer, B. C. Electric Railway Co., Ltd., president.

R. T. Murphy, Murphy Electric Co., vice-president.

H. G. Miller, Canadian General Electric Co., secretary-treasurer.

E. C. Hayward, Hawkins & Hayward, and F. G. Fox, Fox & Mainwaring, auditors.

The first work of the Association is to be the promotion of the electrical appliance idea for Christmas gifts. Following out the Christmas plans of the Electrical Service League of British Columbia, the Victoria Association has adopted the slogan "Say Merry Christmas Electrically." Cards showing the cost of operation of appliances, based on the rates obtaining in Victoria, are being displayed for the first two weeks in December. This educational campaign is to be followed by a week of cooperative advertising in the local papers, which united effort should sell the electrical idea to the Christmas trade and at the same time knit together the various branches of the industry in Victoria.

Later the Association plans an Industrial Lighting Exhibit and an "Electrical Home" in Victoria, for the education of the public to better lighting, and better electrical installations for the home.

Colorado Steel Mills to Reopen on Large Scale

Possibility that the steel mills of the Colorado Fuel and Iron Company at Pueblo would re-open with nearly a full force in the near future has been indicated by Superintendent Getchell of the Walsen coal mine, operated by the company. Getchell declared December 1st found the largest force of diggers in the company's mines in southern Colorado since the start of the strike against a reduction of wages. More than one thousand miners were at work in mines affected by the strike in the Las Animas and Huerfano county districts, Mr. Getchell said, and under reduced wages coal can be laid down at the mines approximately $1 a ton cheaper. Much of the coal from the southern mines is used at the company's steel plant.

"This means that steel can be produced about $4 a ton cheaper and the company should be able to go and get some business," he said.

Books and Bulletins

The Coffin Valve Company, Boston, has issued a booklet describing the Coffin balanced needle valve, one of the latest engineering devices to be perfected by the company. The valve is balanced and has a positive motion and is particularly adapted to control the flow of water at the point of entrance to a closed pipe line or for free discharge.

Donald Bruce, associate professor of forestry of the University of California, has prepared a new volume table for determining the lumber content of white fir trees. Hitherto considered of practically no value, the trees are now being used extensively for rough construction and this is the first volume table covering the species to be issued. It may be had free of charge by applying to the College of Agriculture of the University of California for Bulletin No. 329.

Weber Wiring Devices are described and quoted at length in a new catalog which has been issued by Henry D. Sears, Boston, general sales agent for the Weber line. The first catalog to be issued in twelve years, the publication is one of the most complete in the field. No detail is omitted even to specifying which devices concur with the National Electrical Code Standard.

The Trumbull Vanderpoel Electric Manufacturing Co., Bantam, Conn., has issued Bulletin Eleven covering the safety switches manufactured as a part of its line. The catalog is most complete and contains in addition to regular descriptive material and quotations line drawings and dimensional tables of the various types of switches.

Intermountain Mining Industry Staging Comeback

The metal mining industry of the Rocky Mountain region is staging a rapid comeback, according to recent reports of the American Smelting and Refining Company. Smelter earnings are said to be showing a big increase and with the cessation of operating losses, the regular dividends will be earned.

Considerable new construction is being planned and authorization has already been given to the installation of a new mill at the Yak mines near Leadville, Colo. A concentration plant to handle all ores below the smelting grade will also be built shortly, it is understood.

Reports from the Telluride and Clear Creek districts of Colorado indicate activity while at Cripple Creek several of the producing properties are now showing up better than at any time during the present year.

A bill has been introduced in the Denver city council to regulate charges for steam heat. It is said that the bill is directed against the Denver Gas and Electric Light Company, which furnishes steam heat to many stores and buildings, because the license under which this service is provided expired several months ago.

Meetings of Interest to Western Men

Portland Contractor-Dealers Entertain Architects

A movement to bring about closer cooperation and a more friendly relationship between the contractor-dealers and the architects of Portland was launched November 30, when the Portland members of the Oregon Association of Electrical Contractor-Dealers entertained as their guests the members of the Oregon Chapter of the American Institute of Architects at a banquet at the Chamber of Commerce.

Cooperation between architects and electragists was urged at a banquet tendered the Oregon section of the American Institute of Architects by the Oregon Electrical Contractor-Dealers' Association at the Portland Chamber of Commerce on November 30.

Toastmaster J. R. Tomlinson, treasurer of the contractor-dealers, introduced J. H. Shroufe, president of the Oregon Association of Electrical Contractors and Dealers, who explained the purpose of the meeting and told something of the work of the Northwest Electrical Service League along cooperative lines, pointing out the benefits that would accrue to the members of the two organizations represented by closer cooperation.

The fundamentals and theory of business economics was presented in a most interesting manner by Stephen I. Miller, Jr., secretary-manager of the Northwest Electrical Service League and dean of the College of Business Administration of the University of Washington. W. G. Purcell, president of the Oregon chapter, American Institute of Architects, on behalf of the architects present, thanked the electrical men for the banquet and assured them that the architects were ever ready to cooperate with them. Short speeches were made by O. B. Coldwell, vice-president of the Portland Railway, Light & Power Company, and A. E. McCoy, chairman of the first district, Oregon Association of Electrical Contractors and Dealers.

The program of the evening was concluded by the presentation of a paper on Light and Illumination, by F. H. Murphy, illuminating engineer of the Portland Railway, Light & Power Company.

Vancouver Contractor-Dealers' Association Active

Active membership in the Vancouver Association of Electrical Contractors and Dealers has increased 60 per cent in the four months ending November 30, 1921, the revival of interest being due to the activities of the Electrical Service League of British Columbia in the trade, in the city of Vancouver and the adjacent municipalities.

At the present time the association is actively engaged in assisting the Service League in the furthering of two campaigns for "Better Business," namely, the cooperative advertising campaign to promote the sale of electrical appliances as Christmas gifts and the Industrial Lighting Exhibit.

Recently an election of officers was held for the year ending November 1, 1922, and the following officers were elected:

President, C. C. Carter, Carter Electric Company; secretary-treasurer, P. F. Letts, Letts Electric Company. Executive Committee—Sidney Darnborough, Mundy, Rowland & Co.; S. E. Jarvis, Jarvis Electric Company; J. C. Reston. Ex-officio—W. W. Fraser, retiring president; C. C. Carter, P. F. Letts. Members of the Advisory Council, Electrical Service League of British Columbia—C. C. Carter, W. W. Fraser and E. Brettel.

The association voted to remain as affiliated with the National Association of Electrical Contractors and Dealers instead of joining forces with the contractor-dealer associations of the Pacific Coast states.

COMING EVENTS

AMERICAN ASSOCIATION OF ENGINEERS
Annual Convention—Salt Lake City—June 4, 5 and 6, 1922

WESTERN ASSOCIATION OF ELECTRICAL INSPECTORS
Annual Meeting—Chicago—January 17, 18, 19, 1922

AMERICAN SOCIETY OF ELECTRICAL ENGINEERS
Pacific Coast Convention—Vancouver, B. C.—August 8-11, 1922

Electric Day Marked by Special Programs in S. F. and L. A.

Special programs at the meetings of the San Francisco Electrical Development League and the Los Angeles Electric Club characterized the observance of Electrical Day, December 5. In both places "The Maid of the Mist" was called forth and special efforts were made to make the day a notable one.

In San Francisco, following the meeting, the membership of the league adjourned to the California Industries Exposition. R. H. Ballard, vice-president and general manager of the Southern California Edison Company, speaking before the San Francisco body on "Electric Power Development and Its Relation to Industry," showed wherein municipal development of power failed by citing the case of the city of Los Angeles, and the province of Ontario, Canada. In Canada, he declared, rates were such that they practically eliminated the farmer, who is one of the largest users of power in the West. Only one per cent of the power generated by the Ontario system is furnished to the agricultural industry while the rates charged are double those charged to other industries. Regarding Los Angeles, he said:

"Promises that the proposed California experiment will be absolutely self-sustaining, without any charge upon the taxpayer, and that costs of service will be low, are freely made. Exactly the same character of promises were made in the inception of the Los Angeles municipal power plan. Under date of December 1, 1912, the Los Angeles voters were officially promised that 120,000 horsepower would be developed along the aqueduct, at a total expenditure of $7,200,000, but the annual report of the Municipal Power Bureau, June 30, 1921, shows an investment of $10,717,000, with only 72,000 horsepower developed. The continuance of development at this cost, of the remainder of the 120,000 horsepower, would require a total expenditure of $18,000,000.

Welding Society Forms Sections in Pacific Coast Cities

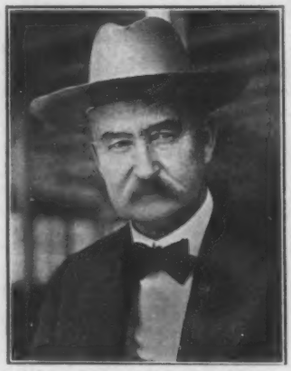
Five sections of the American Welding Society are in the process of formation on the Pacific Coast as the result of a visit to the West by C. A. McCune, vice-president of the organization. Seattle, Portland, Spokane, San Francisco and Los Angeles are the western cities to which the national organization has spread its activities. During past years there has been considerable agitation for the organization of the branches of the society on the Pacific Coast and, according to Mr. McCune, in each of the five cities the preliminary plans met with a hearty response. It is expected that all of the sections will have effected permanent organization shortly after the first of the new year. Such an organization will be perfected in San Francisco at a meeting to be held January 13.

The seventeenth annual convention of the Western Association of Electrical Inspectors will be held at the Hotel Sherman in Chicago on January 17, 18 and 19, 1922.

Good will advertising is being emphasized by the Montana Power Company in Butte, which is conducting an extensive campaign throughout the state in which they are offering $500 in prizes for a trade mark.

Personals

Albert B. Fall, Secretary of the Interior, delivered President Harding's message to the League of the Southwest at Riverside last week and later conducted the government hearing on the Colorado River projects at San Diego. Interested in the development of power in National Forests and on the public domain, Secretary Fall was one of the most active government officials at the momentous hearings. A member of the Federal Power Commission, the body which will ultimately decide to whom a license for the development of the river will be issued, he was highly interested in the data presented before the sessions, both from a personal and official standpoint. Secretary Fall was a former senator from New Mexico. He is a farmer, stock raiser and mining man of Three Rivers, N. M., and as such is the possessor of a large amount of first hand information on the need for flood control and the possibilities for both irrigation and power from the development of one of America's sources of potential power.



A. B. FALL

H. G. Weeks, one of the oldest employes of the California Railroad Commission, has been named chief of the transportation department of the engineering division of the commission, the newest adjunct to that body's activities. Mr. Weeks, whose long experience well qualifies him for his new post, will be under the direct supervision of **Richard Sachse,** chief engineer of the commission.

Arthur B. Wollaber, district manager for the Southern California Edison Company at Pasadena, is highly optimistic regarding general business conditions as the result of a trip through the eastern states inspecting various electric plants.

H. Y. Carson, research engineer for the American Cast Iron and Pipe Company, Birmingham, Alabama, recounted some interesting experiences in connection with sanitation in Palestine, when he spoke at the San Francisco Engineers' Club under the auspices of the A. S. M. E.

W. Carrick Wedderspoon of the firm of Carrick Wedderspoon and Company, Ltd., an electrical supply house of Christchurch, New Zealand, is a recent San Francisco visitor. Mr. Wedderspoon was en route to New York in the interests of his company, and while in California inspected some of the recent hydroelectric developments.

K. E. Van Kuran and **E. A. Hopkins** of Los Angeles, **L. M. Cargo** of Denver, **W. B. McDonald** of Seattle and **W. H. Whiteside** of Pasadena have been spending several days in San Francisco attending conferences of the western branch managers of the Westinghouse Electric and Manufacturing Company.

Ikutaro Inouye, electrical engineer for the Japanese Government Railways, is studying hydroelectric development and electrification problems in the West before going to Schenectady to consult with General Electric Company engineers regarding contemplated improvements to the Nipponese railways.

Gilbert N. Lewis, professor of chemistry at the University of California, and **E. C. Franklin** of Stanford University are the two outstanding western men who have been suggested as candidates for the presidency of the American Chemical Society. It will be remembered that Professor Lewis was the winner of the Gilbert medal for 1920 as well as the possessor of an enviable war record.

J. A. Cranston, Northwest manager for the General Electric Company with headquarters in Portland, is a recent San Francisco visitor, where he conferred with officials of the company.

W. A. W. Bundock, an electrical engineer of the Department of Public Works, Sydney, Australia, recently arrived in San Francisco on the S.S. Tahiti. Mr. Bundock is making an exhaustive study of hydroelectric development, transmission and substation equipment. His itinerary will include a tour of the United States and England.

Superior Judge E. P. Shortall of San Francisco demonstrated his desire to thoroughly understand the case in question, when he adjourned court for two days in order that he might visit the Potter Dam on the Eel River in Mendocino county. The dam was the subject of litigation in the San Francisco superior courts.

William E. Watson, J. L. Roberts and **A. W. Dull,** engineers from the Schenectady plant of the General Electric Company, were guests aboard the United States battleship California, on that vessel's trial trip in Pacific Coast waters recently. The California was built at the Mare Island yards on San Francisco Bay, and is electrically operated throughout. The trials, according to the engineers, were highly successful, and fully demonstrate the practicability of electrically operated fighting craft.

M. L. Sindeband, electrical engineer for the American Gas and Electric Company of New York City, has been in California conferring with officials of the Pacific Gas and Electric Company and the Great Western Power Company on problems of high tension transmission lines. According to Mr. Sindeband, his company is contemplating following the example set by western companies, and erecting a 220,000-volt transmission line in the near future. Following conferences in San Francisco, the engineer proceeded to Los Angeles where he met with engineers of the Southern California Edison Company for a discussion of the same problems.

William Gerig, assistant chief engineer of the Alaska Engineering Commission, has retired according to official reports at Seattle. One of the pioneers in the construction of the Alaska government railroad, Mr. Gerig joined the commission in 1917 as consulting engineer in charge of harbor and pier construction in the far northern territory and was later in charge of the Anchorage Division. In 1919 he was appointed to his present post.

Frank Boyd, San Francisco manager of the small motors department of the General Electric Company, recently returned from a month's visit to eastern manufacturing centers. He reports that many of the factories which have been practically closed during the business depression have reopened as the result of foreign orders.

C. A. McCune, engineer for the Page Steel and Wire Company and vice-president of the American Welding Society, has been on the Pacific Coast for the purpose of organizing sections of the society for the promotion of welding in the West. Under his direction preliminary steps in the formation of chapters were taken in Seattle, Spokane, Portland, San Francisco and Los Angeles.

Robert L. Eltringham, executive secretary of the California Electrical Cooperative Campaign, presided over the recent Electrical Day luncheon of the San Francisco Electrical Development League which inaugurated the seven days of intensive activity from December 5th to 12th, known as Electrical Week. This institution was started this year by the Cooperative Campaign as the most effective method of publicity toward furthering the Christmas electrical merchandising season. Feature meetings were held simultaneously by the Electric Clubs of Los Angeles and San Francisco, the day was celebrated as Electrical Day at the California Industries Show and special efforts were made to secure electrical displays by merchants in all parts of the state. Mr. Eltringham's careful plans and personal efforts were largely responsible for the success of the event, which it is hoped to make an annual affair.

R. L. ELTRINGHAM

Robert Sibley, editor of the Journal of Electricity and Western Industry, was re-elected to the vice-presidency of the American Society of Mechanical Engineers, at the annual meeting in New York City.

Herbert S. Sands of the Denver Westinghouse office has been appointed on the committee which will build the new cathedral for the Colorado Consistory of Scottish Rite Masons in that city.

F. F. McCammon of The Denver Gas and Electric Light Company has been appointed on the committee superintending the wiring of the first electrical home now being constructed in Denver by the Electrical Cooperative League.

R. B. Childs, superintendent of the Intermountain Power Company, which furnishes current to the lines of the Chicago, Milwaukee and St. Paul Railway for the operation of its electric trains, predicted the ultimate electrification of every major railroad in the West in a discussion of the subject before the Spokane section of the A. I. E. E. on December 2.

R. B. Clapp, of the firm of Clapp and LaMoree, Los Angeles manufacturers' representatives, is making an extended tour of the East where he expects to secure first hand information of new developments in the electrical industry which will be applicable to conditions in the West. His firm has recently been made Southern California representative for Stanley and Patterson, manufacturers of telephone apparatus, and hospital and fire alarm signals.

Bertram D. Dean, former member of the engineering staff of King County, Washington, has been appointed resident engineer for the $430,000 Pasco-Kennewick bridge which is being erected over the Columbia River by the Inter-County Bridge Company of Walla Walla. The bridge when completed will

B. D. DEAN

be one of the most imposing in the Northwest. Mr. Dean is vice-president of the Seattle section of the American Society of Civil Engineers, a member of the Engineers' Club and state adjutant of the Veterans of the Foreign Wars. He is the possessor of a brilliant war record, having served with the United States Army Engineers overseas for eighteen months with the rank of a captain and distinguishing himself in the Meuse-Argonne offensive.

W. A. Roper, C. H. Elliott, M. W. Bailey and **W. J. Laufenburg**, all employes of Denver electrical firms, were awarded prizes for obtaining new members in the contest recently held by the Denver Motor Club, of which **W. J. Barker**, the general manager of The Denver Gas and Electric Light Company, is president.

J. J. Cooper, J. W. Ryall and **J. C. Davidson**, representing three of the largest electrical jobbers in Denver, attended the national convention of the jobbers' association in Cleveland.

E. M. Cutting, known to the electrical industry of the West as "Uncle Ed" through his former connection with the Edison Storage Battery Company, has added the field of real estate to his present activities as a representative for the Franklin Motor Car Company in Los Angeles.

Martin J. Insull of the Middle West Utility Company of Chicago, was a guest of the Rocky Mountain division of the N. E. L. A. committee on public utility information at luncheon in Denver November 29. He later made an address to the students at the Colorado School of Mines at Golden, Colorado, through arrangements of **E. A. Phinney**, general manager of the Jefferson County Power and Light Company at that place.

C. G. Kozett, former assistant engineer in the mechanical and electrical department of the Panama-Pacific Exposition and later holder of the same position with the Department of Engineering for the state of California, has been appointed chief draftsman for the Seattle school department. Mr. Kozett is a graduate of the College of Mechanics of the University of California with the class of 1908. Seattle at the present time is undertaking a $4,000,000 school building program.

E. W. Crane, California engineer who has been directing hydroelectric development in Mexico and Cuba since 1900, has returned to Los Angeles, where he has opened offices as consulting engineer with **Harry G. Holabird** under the name of Crane and Holabird. Mr. Crane, who was a member of the class of 1895 at Stanford University, has been identified with some of the major power developments of the southern republic during the most progressive years of its growth. Mr. Holabird will still continue as representative for the Ohio Brass Company for Southern California.

L. W. Fay, former advertising manager for the Century Electric Company of St. Louis, Mo., has accepted a position in the publicity department of the Pacific Gas and Electric Company in San Francisco. He succeeds **D. H. Roundtree** who has resigned.

D. W. Murphy, Los Angeles engineer, has been appointed consulting engineer on the drainage work for the Imperial Valley irrigation work. For many years an engineer with the U. S. Reclamation Service, Mr. Murphy has contributed much original research on the subject of drainage as applied to the irrigated lands of the West. The inability to control the ground water level has seriously interfered with the growing of crops in the Imperial Valley, and Mr. Murphy is expected to solve the problem as efficiently as he did in the Salt River Valley several years ago.

Obituary

William Maxwell Wood, assistant general manager of the Pacific Power and Light Company, died in Portland on November 4 of blood poisoning. Born at Vancouver Barracks, Washington, on January 23, 1884, he was educated in Portland, having been graduated from the Portland Academy in

W. M. WOOD

1902. After studying for a short time in Germany he entered Cornell University and was graduated as an electrical engineer with the class of 1908. With the exception of a short period, Mr. Wood has been with the Pacific Power and Light Company continuously since his graduation, having served as purchasing agent, local manager at Sunnyside, Washington, district manager at Lewiston, Idaho, and finally as assistant general manager. His pleasing personality caused him to be one of the most popular men in the electrical profession in the Northwest. He was an expert mathematician with a very wide knowledge of the application of mathematics to economic, rate interest, depreciation and annuity problems. He was in charge of personnel work, and rate and tariff questions. He is survived by a widow and three small sons.

Gustavus O. Newman, chief engineer for the San Joaquin Light and Power Corporation and the Midland Counties Public Utility Service, died at his home in Los Angeles recently, bringing to a close a career of over fifty years as an engineer in this country. Born in Sweden in 1844, and educated in the schools of that country, he came to the United States in 1868. He is credited with the construction of the first concrete bridge in this country, having imported the cement from Germany. He was one of the pioneer irrigation engineers in the West and had been with the U. S. Geological Survey and the Central Pacific and Southern Pacific railroads. His connection with hydroelectric development began with the San Gabriel Electric Company in 1897. He is survived by a widow, a daughter and three sons. His passing is not only a loss to his company, but to the engineering profession of the entire West.

James Crilly, Pacific Coast representative for the Habirshaw Electric Cable Company, Yonkers, N. Y., has returned to his San Francisco offices after an extended visit in the East.

H. J. Dansdill, representing **The Luminous Unit Company,** and specializing in Brascolites, has taken charge of sales in Kansas and Nebraska and as a result moved his office from Denver to Omaha.

H. Alex Hibbard, Inc., of Denver has taken on several lines of automotive accessories for distribution between the Rocky Mountains and the Pacific Coast.

E. E. Aldous of the Denver branch has been appointed manager of the St. Paul office of **The American Steel and Wire Co.**

A display of all small heating appliances manufactured by the Westinghouse Company was recently conducted in Denver for the benefit of the electragists in that city by **Carl H. Heintz,** western sales supervisor.

Ralph B. Clapp of Clapp and La Moree, Los Angeles, recently visited in Denver in order to establish connections with his firm for the distribution of California made goods.

One of the most interesting windows recently displayed in Denver is that of **Scott Bros.,** showing perpetual pouring of coffee from a percolator held by a life-size model. A. R. Woolley of the Edison Electric Appliance Co., Salt Lake City, made the installation.

The National X-Ray Reflector Company is emphasizing the electrical Christmas idea in a campaign to have every municipal outdoor Christmas tree in the country this year lighted with floodlighting projectors.

The Pueblo Battery Manufacturing Co., with temporary offices at 85 Opera House Bldg., Pueblo, Colo., has been organized to manufacture all types of storage batteries.

Clapp and LaMoree, engineers and sales representatives of Los Angeles, have opened a branch office at 589 Howard Street, San Francisco. **S. E. Dunn** will have charge of the Northern California branch which will handle material ranging from tools to telephone, signal and substation apparatus.

J. F. Roche, manager of the sales promotion department of the Edison Electric Appliance Company, Chicago, is making a tour of the Pacific Coast. His itinerary will include Los Angeles, San Francisco, Portland, Seattle, Spokane and Salt Lake City. He is inspecting the Edison service stations which are located in each of these cities.

The O. B. Kibble Engineering Corporation has been organized in Los Angeles to succeed the Humphrey Engineering Construction Company. No changes in the personnel of the parent company are contemplated. On December 1 the firm occupied new and larger quarters in the Union Oil Building in the Southern California metropolis.

The Western Electric Company has instituted a sales contest among its vacuum sweeper salesmen, the prize for which will be a trip to the company's manufacturing plant in Worcester and a half-week enjoying the sights and sensations of New York City. The company has divided the country into three districts and one salesman will be sent from each.

Manufacturer, Dealer, and Jobber Activities

The American Ironing Machine Company has closed its Denver office in the Empire Building, although a representative is still maintained in that city.

Allen's Electric Appliance Co. is the name of a company recently organized at Fort Lupton, Colo., under the management of **Edwin Lewis.**

Charles Clifford has opened an electrical appliance store in the Christensen Building, Bingham, Utah.

The Alden Electric Appliance Company of Fort Lupton, Colo., has been incorporated with a capital stock of $150,000 by J. B. Alden of Brighton, Dr. Edwin Lewis, Jesse M. McKay, S. J. Camenger and G. B. Lewis of Fort Lupton. The purpose of the company is for the manufacture and sale of electrical appliances and machinery.

J. G. Lengel, manufacturers' agent of Los Angeles, has returned to his western headquarters after a four months' tour of the East. Mr. Lengel announces that he has been appointed western distributor for the **Max Schaffer Company** of New York City, manufacturers of illuminating glassware, portable lamps, floor lamps and lighting fixtures.

The F. E. Newbery Electric Company has opened a new and modern store at 359 Sutter Street, San Francisco. The store is unique in that it is merchandising a well known line of phonographs and records jointly with a full line of household appliances, fixtures and wiring devices.

The Trumbull Electric Manufacturing Company has announced a reduction in prices ranging from 10 to 15 per cent on open knife switches, and slate and porcelain fuse blocks.

The Shepard Electric Crane and Hoist Company, Montour Falls, N. Y., has announced the placing on the market of the Liftabout, a small general utility hoist designed for every load-moving job. The new device fills a long-felt want in addition to providing an economical and labor-saving mechanical means of lifting and carrying a multiplicity of loads.

The Westinghouse Electric and Manufacturing Company has recently placed on the market a new cholocate warmer designed for use in candy factories. The device consists of a sheet metal warming pan, containing a hermetically sealed retaining vessel which covers the heating element, with a re-heat snap switch and six feet of flexible cord.

The American Wiremold Company of Hartford, Conn., has opened a New York district sales office at 71 West 23rd Street, New York City, under the direction of H. B. Kirkland, vice-president of the company.

The American Insulated Wire and Cable Company, Chicago, has completed arrangements for the distribution of its "American Brand" leather-bound vest pocket catalog and encyclopedia on wire and cable. The catalog will be distributed to anyone requesting it.

The Ajax Electrical Specialty Company, St. Louis, has brought out two new types of plural socket plugs, literature on which is now available.

The Automatic Electric Heater Company, Warren, Pa., manufacturer of Sepco water heaters, has issued a valuable sales manual containing figures on the amount of hot water used by an average family, the temperature that should be maintained and the cost of hot water consumed in residences of various sizes, all based on an investigation of several thousand actual cases.

The Torrington Company, Torrington, Conn., has reported that shipments of vacuum cleaners are exceeding by 200 per cent the shipments for the same period of 1920. The company has announced that the time limit on its special offer of a set of attachments free with each cleaner sold has been extended to December 31.

The Westinghouse Electric & Manufacturing Company announces the following changes in its service department: B. B. Burkett has been appointed district service manager in the Seattle office, succeeding N. P. Wilson, who has been transferred to sales service activities on switchboards and similar apparatus in the Seattle territory. The Salt Lake service department has been made a branch of the Denver office, under the direction of A. F. Maccallum, district service manager, Denver. M. R. Davis, formerly district service manager at Salt Lake, will remain at Salt Lake and devote his time to field service work and to securing repair business for both shops.

The Edison Electric Appliance Company, through its Salt Lake City office, will conduct a special selling campaign with the Western Light and Power Company at its northern Colorado properties early this month .

The Sechrist Manufacturing Company of Denver, which specializes in all types of lighting fixtures, has developed and patented a 660-watt electric pressure cooker which will be introduced on the market early next year.

DRIVER, BRASSIE, MASHIE AND PUTTER

We offer representatives of all four branches of the electrical industry on the Pacific Coast in one group, showing the same cooperation in chasing the little white pellet as they do in watching the gyrations of the white cubes or in their meetings. We make no attempt to pick the "Jock Hutchinson" from this crowd for a bitter argument might result. Left to right, the exponents of the Scotch game(?) are: A. W. Childs, superintendent of sales, Southern California Edison Company; R. M. Alvord, manager, supply department, General Electric Company, San Francisco; D. E. Harris, vice-president and general manager, Pacific States Electric Company, and G. E. Arbogast, manager of the F. E. Newbery Electric Company, Los Angeles. Or they might be dubbed central station, manufacturer, jobber and contractor dealer.

Business Outlook in Western Market Centers

Reflecting the Trend of Community Thought on Conditions and Events Affecting Business and Industrial Activities Throughout the West

Compiled and edited for the Journal of Electricity and Western Industry by correspondents in all principal Western cities.

BUILDING PERMITS AND BANK CLEARINGS FOR NOVEMBER IN 7 WESTERN CITIES

	No. of Permits	Value	Bank Clearings
San Francisco	613	$2,224,606	$573,700,000
Los Angeles	4,242	8.685,775	376,010,000
Spokane	183	118,205	45,026,000
Seattle	735	593,800	128,739,000
Portland	1,082	1,374,615	128,828,000
Salt Lake City	157	385,876	62,568,000
Denver	490	981,600	146,168,000

SAN FRANCISCO

Leading retail stores report some increase in business, but trade with wholesale dealers and manufacturers continues very quiet, and there is no appreciable reduction in the number of unemployed. Building operations are active, however, and trade in hardware and building supplies has improved. A feeling of confidence prevails, and a large holiday distribution is anticipated. Recent rains have been very beneficial in the farming section. Collections continue slow.

Considerable tonnage of dried fruit has been exported to Europe, and payments for deliveries of dried fruit have been made to growers by several cooperative associations in California.

PORTLAND

Business has completely recovered from the reverses caused by the sleet storm of a few weeks ago and holiday buying is now on in full swing. Bank clearings, building permits, and shipping were very good for November although they did not measure up to the months of October and September. Owing to financial and credit conditions jobbing business does not equal the volume of a year ago. Retail buying is slightly below normal. Conditions in the lumber industry remain good although production is still about 15 per cent below normal. There is a scarcity of logs and all-winter operation of logging camps on the Columbia river is expected. There is a shortage of experienced men but common labor is plentiful.

Electrical contracting business is good and there exists a shortage of journeymen wiremen. Jobbers and retailers' stocks are in good shape and a fair volume of holiday business is expected.

LOS ANGELES

While the motion picture industry continues to mark time as it has done for the past year, there is indication that an upward trend will begin with the first of the new year and many permanent improvements are being made on studio property.

The oil industry shows continuous growth and stored stocks are increasing. The total storage of petroleum in the state which is estimated to be in excess of 30,000,000 barrels, is double that of 1920 for the same month. New fields south of this city are developing rapidly. The gravity of the oil in this section promises to be higher than the average.

Value of building permits for eleven months of 1921 total $73,904,000. More than 240 new subdivisions, double the number in 1920, have been opened to date.

Retail sales in electrical merchandising are reported as fair with some lines better than last year. Those engaged in general mercantile business seem well satisfied with the sales of November and look for good Christmas trade. Collections are reported good.

The Walnut Growers' Association recently distributed the last payment due the growers, amounting to $2,000,000 and representing a satisfactory season.

SALT LAKE CITY

While business conditions in the inter-mountain section have not improved materially, and while there seems to be no immediate prospect for resumption of anything like normal conditions, there are several factors which give promise of relief. One of the most encouraging is the improvement in conditions in the copper market. If this improvement continues, at a fairly reasonable rate, it is very likely that there will be an early resumption of operations by the copper mining companies.

The output of silver and lead ores is being maintained at a rate which is very nearly normal in many of the mining camps where such metals predominate.

The farmers and livestock men are looking forward to relief in the form of government loans in the near future, which will materially relieve the situation in the agricultural districts.

More than $3,000,000 will be paid to farmers of Utah and Idaho for sugar beets delivered between November 1 and December 1 by the various sugar companies, the final payments to be made about December 15.

There has been no improvement in the unemployment situation, and in fact the number of unemployed has increased due to cessation of harvesting activities. However, conditions in this respect are not nearly so acute in the intermountain section as in some other sections of the country.

DENVER

General business conditions here are as good if not better than in any other part of the Tenth Federal Reserve District. A slight improvement is indicated in trade and it is expected that the new year will mark a sharp uptrend.

Although grain movements decreased in November, the production of flour increased 50 per cent over last year's mark. Cattle shipments were greater and packing interests are holding their own. While petroleum production has been speeded up due to the increase in the price of crude oil, coal mining is showing a production of half capacity.

Building operations are benefiting from the weather with the result that November records show little if any decline, especially in the construction of small dwellings.

Jobbers report increased holiday activity with small sales of standard merchandise. This is especially true in electrical lines where it appears many dealers waited until the first of December to place orders. A special cooperative advertising campaign is materially boosting retail appliance sales.

Sharp reductions in prices by department stores after Thanksgiving included a few electrical items. An overstocked condition is believed responsible as sales did not materialize from inquiries as rapidly as was anticipated.

SEATTLE

Further increases in the shipments of lumber from the Northwest by water is reported by the West Coast Lumbermen's Association, which also predicts further increases in the prices of lumber, because of an unprecedented dearth of logs, shortage of stocks in yards and car shortage, which will necessarily become more acute in the spring. The log shortage has been aggravated by storm conditions of the past two weeks, which cut the Oregon log output fifty per cent, and the Washington output fully forty per cent. In the Northwest, ordinarily, weather conditions force a cessation of woods operation from middle of December to middle of February.

An indication of increasing strength in marine trade out of Seattle is the fact that previous records of the city's intercoastal trade were broken in the month of November, when the total of 179,852 net tons were handled.

Retail trade in Seattle is beginning to show a marked effect of holiday buying, and dealers predict a fairly satisfactory showing for the holiday season.

Construction News and Industrial Developments

Suggesting to the Engineer, Contractor, Manufacturer, Dealer, Agent and All Business Men Opportunities for New Business

THE PACIFIC NORTHWEST

SEATTLE, WASH.—The Camas substation of the Northwestern Electric Co. was destroyed by fire recently. The loss is $75,000.

NEWPORT, WASH.—Application of the Kalispell Light and Power Co. for a franchise to erect a power transmission line along county roads and streets has been granted.

SPOKANE, WASH.—A desirable municipal power site is wanted by city officials who plan to hold it for the future needs of the city. Search will be made for a suitable site shortly after Jan. 1st.

SPOKANE, WASH.—The Adam Brown Packing Co. has commissioned Morrison and Stimson, architects, to prepare plans for a three-story, 168 ft. by 74 ft. packing plant to be erected here at a cost of $100,000.

CAMAS, WASH.—The sub-station of the Northwestern Electric Company was totally destroyed by fire recently entailing a loss of $75,000. S. E. Carlton, local manager for the company, announces that the station will be immediately rebuilt.

YAKIMA, WASH.—N. H. Medbury, inventor of an automatic hot water injector and wrench pump for irrigation, has announced that he will immediately form a $500,000 corporation and erect a $100,000 plant for the manufacture of the pump. W. F. Miller of Yakima will head the company as president.

TACOMA, WASH. — The Carstens Packing Company has prepared plans for the first of four new buildings to be added to the Tacoma plant. The proposed structure will be 180 ft. by 120 ft., four stories high, and will cost $300,000. It will be used for a tank room and fertilizer warehouse.

SEATTLE, WASH.—The Todd Drydocks plan the immediate expenditure of $175,000 for the construction of the fifth unit of a floating drydock now in use at Harbor Island, where the company's plant is located. When completed the drydock will have a lifting capacity of 15,000 tons.

SEATTLE, WASH.—Plans and specifications for a seawall and dock to be built at the Puget Sound Navy Yard at Bremerton are practically ready, according to word from Washington. Bids will be called for shortly after the first of the year. The work involves an expenditure of $1,100,000.

RAYMOND, WASH. — Plans and specifications for a new bridge to span the Willapa River at the site of the present structure have been completed. The structure will be of steel with perpendicular draw, affording a 125-ft. passageway for ships. It will have a 20-ft. roadway with sidewalks on each side. The cost of construction is estimated at $175,000.

VANCOUVER, WASH.—The Britannia Mining and Smelting Company has authorized the rebuilding of a large ore concentrator and mill near Britannia Beach. The mill will have a capacity of 2500 tons, making this the largest copper mill in British Columbia. The equipment will include 18 tube mills and five rolls. The work is estimated to cost $1,000,000.

TACOMA, WASH.—The Tacoma Port Commission has set December 29 as the final day for submitting bids for the construction of the new transit shed on pier No. 2. Plans prepared under the direction of G. W. Osgood, manager of chief engineer for the commission, call for a structure 1040 ft. long and 180 ft. wide of reinforced concrete and tile.

SEATTLE, WASH. — Plans for a thirteen-story $1,000,000 addition to the New York block in Seattle, owned by the Dexter-Horton Estate, have been completed and work of construction will begin shortly after the first of the year. The building will be of granite, brick and terra cotta. Plans were prepared by John Graham, architect, L. C. Smith Building.

THE INTERMOUNTAIN DISTRICT

ESCALANTE, UTAH.—Escalante has voted a bond issue for the purpose of purchasing the light and power plant in that city and making it a municipal plant.

LEADVILLE, COLO.—The American Smelter and Refining Company has authorized the construction of a new mill and concentration plant on the Yak properties.

GLENWOOD SPRINGS, COLO. — The local central station has broken ground for a new store building which will house the offices, salesrooms and wiring shop.

CANON CITY, COLO.—Excavation has been started on the new Williamsburg high school which when completed will cost $20,000, according to B. A. Burton, the superintendent.

SALT LAKE CITY, UTAH.—The Silver King Consolidated Mining Co. of Park City, Utah, whose smelter was burned about a year ago, is planning to rebuild in the near future.

DENVER, COLO.—The shops and warehouses of the Denver Tramway Company are to be enlarged. An addition and various other improvements to the building costing $25,000 will be undertaken shortly.

BOULDER, COLO.—The most expensive college fraternity house at the University of Colorado will be that of the Chi Psi fraternity. It will cost over $60,000 according to the contractor, Frank Kirchoff of Denver.

BONNERS FERRY, IDA.—The Great Northern Railway Co. is planning the construction of new bridges and trestles on the Kootenai Valley Railway, a branch line running from Bonners Ferry to Porthill, a distance of 38 miles.

SALT LAKE CITY, UTAH.—The city recorder has been authorized to advertise for bids for the construction of a 10,000,000-gallon emergency reservoir at Sunnyside Avenue and the Parley's line conduit. The approximate cost will be $25,000.

DENVER, COLO.—Colorado Consistory of the Scottish Rite Masons have voted to erect a $500,000 cathedral on property already owned by that organization, facing the state capitol building. Charles A. Stokes is the chairman of the building committee.

DENVER, COLO.—The local chapter of the American Society of Civil Engineers has drawn plans for the construction of an Engineers' Building to house its own members, architects, and allied lines. It will be ten stories high and the estimated cost is $290,000.

DENVER, COLO.—The Fontius Shoe Co., one of the oldest retail shoe firms in this city, is planning on taking part in the "up-town movement" as is shown by its decision to construct a new store building at 16th and Welton Sts., which will cost about $150,000, according to Harry E. Fontius.

DENVER, COLO.—As the result of the Broadway extension, a new commercial center is developing northwest of the main business section and in this territory one of the latest type garages, sales and service stations will be constructed by The Kempter Bros. Motor Co. of this city at an estimated cost of $85,000.

MALAD, IDA.—Representatives of Canyon, Gem, Payette, Washington, Malheur and Owyhee counties have agreed upon the essential details to govern the formation of a livestock loan company to operate in southwestern Idaho. The name of the company will probably be the Farmers' Livestock Loan Company. It is to have an authorized capital of $200,000, at least $30,000 of which is to be paid in immediately.

OGDEN, UTAH.—Factories of the Amalgamated Sugar Company in Utah and Idaho will operate on sugar beets until the latter part of January. The sugar beet harvest which started in September has been completed in both states and all of the beets have been delivered to the various factories. It is estimated that more than 650,000 tons of beets have been hauled to the company plants in the two states this season, which is 70,000 tons more than the 1920 record.

BOULDER, COLO.—Ground has been broken for the new $430,000 gymnasium that is to be erected on the University of Colorado campus on the location of the old S. A. T. C. barracks. A contract for the removal of 4,000 square yards of dirt has been awarded and the company in charge expects to complete this task within two weeks. The university stone quarries are being worked and sand is being hauled onto the ground, so that concrete work can begin this coming month if weather conditions are favorable.

THE PACIFIC CENTRAL DISTRICT

HEROULT, CAL.—The electrical iron smelter of the Noble Electric Steel Co. will be purchased in the near future, it is reported, by a steel company headed by W. E. Creed.

BERKELEY, CAL.—The J. & E. Battery Co. of Philadelphia is contemplating the erection of a $250,000 plant on the Berkeley waterfront if a satisfactory location can be secured. H. E. Robinson is president of the company.

EUREKA, CAL.—Construction on the community owned $300,000 Redwood Inn will be started at once. The Eureka Chamber of Commerce has placed itself on record for an open shop plan of employment in the construction of the hotel.

SAN FRANCISCO, CAL.—A four-story and basement reinforced concrete building will be erected on First Street, south of Mission, this city, by Luke Fay. The building will be completed early next year and will be occupied by the dry goods firm of Coppel Bros.

FRESNO, CAL.—Architect H. R. Lake of San Francisco and R. F. Flechlin of this city are collaborating on the plans for a 10-story hotel to be erected at Inyo and J Streets for the Sun Maid Hotel Corporation. The financing is to be done locally by subscription.

STOCKTON, CAL.—A modern fruit packing shed will be erected by the T. H. Peppers Fruit Co. at Lodi, to cost $20,000. A. E. Erb is local manager. The American Fruit Growers are also planning the erection of a new packing shed in So. Lodi. J. Prontico is local manager.

FRESNO, CAL.—The Brix estate expects to build a 6-story office building on their property on J Street in the near future. The plans have been prepared by Eugene Mathewson, architect, who says the estimated cost is $350,000 and the structure will be one of the most attractive buildings in Fresno.

EUREKA, CAL.—All revenue above operating costs on the Eureka Street Railway will be turned back immediately into improvements and reconstruction, according to a statement recently made by Councilman H. Gross. A converter of larger capacity than that now used will be one of the first purchases made.

CHICO, CAL.—Construction work will start soon on a $60,000 distributing plant for the Shell Oil Co. on the Thomasson ranch near Chico. Present plans call for a water plant, wells and pumps. Arrangements have been made with the Pacific Gas & Electric Co. for a power line to the site. C. M. Carson is chief engineer of the Shell Co.

SAN FRANCISCO, CAL.—Contract for the new industrial home of the Salvation Army has been awarded and work will start in the near future. The building will be located on the site of the old home on Harrison Street and will contain a store, paint and cabinet shop, machine shop, etc. Brig. Reed is in charge of the home.

OAKLAND, CAL.—The Hutchinson Company, through A. C. Blumenthal & Co., has sold to a San Francisco syndicate comprising Dunn-Williams Co., MacDonald & Kahn and A. C. Blumenthal, a lot on the east side of Brondway near Seventeenth St. The purchasers contemplate the erection of a four-story store and office building to cost approximately $75,000.

FRESNO, CAL.—The Mendota Irrigation District, organized last month, has filed with the state division of water rights an application for diverting water from the Kings River, near Fresno, for the irrigation of 70,000 acres of land in Kern county. It is proposed to divert 2500 cu. ft. of water per second for the generation of 10,000 hp. to be used in the pumping plant.

SACRAMENTO, CAL.—Weeks & Day, architects, have prepared plans and specifications for an 18-story bank and office building to be erected at Seventh and K Streets for the Sacramento-San Joaquin Bank. The building was first planned about two years ago but due to wartime cost of building material and labor the plans were laid aside awaiting more favorable conditions.

SACRAMENTO, CAL. — Advertisements for bids for the entire superstructure of the Capitol Extension Buildings to be erected on the blocks, Ninth and Tenth, L and N Streets, have been authorized by the State Building Commission. The work on which bids are asked includes excavation, piling, concrete work, granite, terra cotta and brick and an alternate bid on manufactured granite and steel.

OAKLAND, CAL.—Harry W. Fawke, superintendent of hull construction of the Moore Shipbuilding Co. for the past 12 years, has purchased the Stockton Iron Works of Stockton. He is planning the construction of an additional plant for the purpose of doing a general ship repair business as well as structural work. He is associated with Edward McKarley and the firm will be known as the Terminal Iron Works.

RIVERBANK, CAL.—M. J. Chamberlain, of the Santa Fe Ry., Los Angeles, has contracted with the Riverbank Water Co. for water necessary for the construction of the new $250,000 ice plant on which work will be started immediately. Several miles of new track will be laid by the railway company which has appropriated $35,000 for that purpose. It is believed that the requirements of the ice plant will make it necessary for the water company to enlarge its plant.

THE PACIFIC SOUTHWEST

SAN PEDRO, CAL.—The Pacific Mail Co. is planning the erection of a $400,000 terminal.

MIAMI, ARIZ.—Bids for the construction of the proposed Globe post office will be again called for in the near future.

BANNING, CAL.—The Southwestern Home Telephone Co. will erect an office building on lots purchased on San Gorgonio Street adjoining the Alta Vista Hotel block.

LOS ANGELES, CAL.—A hotel of concrete construction, containing store-rooms, lobby and restaurant, will be erected at Los Angeles Harbor at a cost of approximately $200,000.

LONG BEACH, CAL.—Work will begin this month on the 6-story Drake-Porterfield Building, Pine Avenue Pier and Union Pacific Rail Station, to cost between $150,000 and $200,000.

POMONA, CAL.—The city has received bids for a small addition to its ornamental lighting system. The new posts are to be installed on Randolph Street between Park and Wisconsin.

LONG BEACH, CAL.—Wallace, Bush & Skidmore, Los Angeles, have been awarded the contract for the erection of the Sovereign Apartments, Ocean and Chestnut Sts., price $500,000.

HOLLYWOOD, CAL.—C. H. Pill will erect a theater costing $250,000 at Hollywood and Vermont Avenues. The building will be two stories high and will have a seating capacity of 1200.

LONG BEACH, CAL.—The Kimball Motors Co., M. C. O. Hull, president, announces that work will begin soon on a factory to be erected on West Anaheim Boulevard, at a cost of $100,000.

EL CENTRO, CAL.—The Imperial Valley Irrigation District has set aside the sum of $250,000 to be used under the direction of Daniel W. Murphy in the construction of drainage works.

TUCSON, ARIZ. — The Southern Methodist Church has purchased a tract of land at the corner of Euclid Avenue and 3rd Street, where the erection of a church building to cost $150,000 is contemplated.

SAN BERNARDINO, CAL. — Howard E. Jones, architect, announces plans for complete alteration of the interior of the San Bernardino National and San Bernardino County Savings Bank to cost $65,000.

LOS ANGELES, CAL.—Construction of the Los Angeles Harbor Immigration Station will be started after removal of submarine base buildings from the site at 22nd Street. The work will cost $80,000.

TUCSON, ARIZ.—A sanitarium for disabled locomotive firemen and engine men will be erected here by the National Brotherhood of Railroad Firemen and Engineers. The cost is estimated at $3,000,000.

LOS ANGELES, CAL.—It is rumored that the Farmers and Merchants National Bank is looking for a suitable location to buy and build for themselves a first-class bank and office building for their exclusive use.

CORONADO, CAL.—Louis J. Gill has prepared plans for the erection of a four-story apartment house that will contain more than 100 rooms. Sheridan B. Fry is the owner and the estimated expense is around $250,000.

BURBANK, CAL. — A 21-room apartment house will be erected by Carpenter Bros. for O. B. Cummings at 233 Santa Anita Ave. The permit calls for the expenditure of $25,000. The work will be started at once because of the shortage in housing facilities.

WHIPPLE BARRACKS, ARIZ.—The contract for the U. S. P. H. Service Hospital was awarded to the firm of William Simpson Construction Company of Los Angeles at a figure of $189,995, not including the mechanical equipment. This is said to be the second time this contract was let due to an error in the first bidding.

LOS ANGELES, CAL. — The Baker Iron Works held low bid for the structural steel in the large garage building to be erected on Los Angeles and Washington Streets for Henry M. Owen. Albert C. Martin is the architect.

TUSTIN, CAL.—Farm Center community has formulated a plan for a cooperative cold storage plant to provide facilities for the proper storing of the crops in the immediate vicinity. It is proposed to invest $25,000 in the project.

LONG BEACH, CAL.—The Red Seal Refining Co., capitalized at $1,500,000, will build a plant in the industrial district on West Anaheim Boulevard, costing $600,000. Chas. H. Gifford is president, with offices at 243 E. Ocean Boulevard.

LOS ANGELES, CAL.—C. A. Griffin, secretary of A. G. Blumenthal & Co., lessees of Loew's State Building, announces that the company is planning the construction of seven large buildings on prominent corners here, to cost approximately $11,000,000.

LOS ANGELES, CAL.—The Community Development Association, owner, John & Donald Parkinson, architects, are planning the erection of a reinforced Coliseum Building at Exposition Park, to cost $772,000. Edwards, Wildey & Dixon are the contractors.

ALHAMBRA, CAL.—A five-story hotel building, containing 125 rooms, will be erected at Main Street and Wilson Avenue, according to recent announcement by the Alhambra Chamber of Commerce. Architect's floor plan and drawings have been submitted.

LOS ANGELES, CAL.—The property of Arthur Letts at the corner of 7th and Hill Sts. has been sold to Dunn Williams and Company of San Francisco. It is reported that the new owners contemplate the erection of a 6-story loft building at an early date.

LOS ANGELES, CAL.—James H. Adams will erect a 10-story and basement Class A building on Olive Street near 8th. Richard D. King is the architect. The Southern California Telephone Co. will occupy the building and will install office partitions and fixtures.

VENTURA, CAL.—A water application has been filed by Leeds and Barnard of Los Angeles to irrigate 4,500 acres with water from the North Fork of the Ventura River. Application also requests the appropriation of a dam site to impound 5,000 acre-feet per annum.

PASADENA, CAL.—The contract for the refrigeration equipment in the addition to the Pasadena Hospital was awarded to the Bedell Engineering Co. of Los Angeles. The figure was approximately $15,000. H. H. Walker was low bidder on the electrical work at $9,200.

SAN DIEGO, CAL.—The permit for the first of three large apartments has been secured in the name of James E. Collumb, owner and builder. The cost is given as $200,000 and there will be fifty-three apartments of two and three rooms each. Eugene M. Hoffman is the architect.

FRESNO, CAL.—The local lodge of the B. P. O. E. has launched its plans for a magnificent club house to cost not less than $300,000 including furnishings, and have started their committees on the financing campaign to put it over. Details of the plans will be announced shortly.

FRESNO, CAL.—The merger of the Fidelity Trust and Savings Bank with the Los Angeles Trust and Savings Bank will give Fresno better financial support, but the new bank officials have announced that a start will be made at once on a new bank and office building to cost $300,000.

SANTA MONICA, CAL.—This city will have a big addition to the pleasure piers in the way of a $1,500,000 enterprise, if the plans of Lycurgus Lindsay are approved by the city council. It is proposed to build the pier at the foot of Hollister Avenue, extending into the ocean one-fourth mile, and to be 400 feet wide.

Why Lawyers Buy Pierce-Arrows

In these days when each of the three or four hundred government commissions has a compendium of regulations which looks like an encyclopedia—and even skirts are regulated,—it is a wise man who can avoid fine and imprisonment. Business letters of the future will be patterned after the following model communication:

Smith Manufacturing Co., Rochester, N. Y.:

Gentlemen: Referring to your letter [see Postal Regulation, p. 126, 11, 44] of the 28th, we, a corporation organized under the laws of Ohio, certificate filed in the office of the secretary of New York state, New York, beg to advise you that we can quote the price of $20 [see United States revised statutes, laws of 1914, sec. 18] per ton carload lots [see interstate commerce ruling 256; see also dicta of 128 U. S. 264; Brown vs. Pennsylvania Railroad Company, 168 Pa. 267]. This quotation is special to you [see ruling of department of justice in the matter of Brown Milling Company] and is made subject to our right to claim immunity [see N. Y. Penal Code, p. 48]. If you receive a better quotation from any of our competitors you will, of course, advise us under the authority of the U. S. Revised Statutes, p. 2247, sub. 2. We shall be glad to fill your order [subject to rule laid down in the leading case of Jackson vs. Cobb, 126 U. S. 232] and will ship according to your instructions [see rule 37, New York Public Utility Commission].

Yours very truly,

J. P. JONES.

* * *

Can You Beat It?

He bought a bit of butter
For his wife to make some batter,
But the butter it was bitter
And the boarders grew no fatter.

For the bitter butter bought her
Made the bit of batter bitter
When he tried to bite her biscuit
Like a bitter brute he hit her.

So he bet her he could beat her
But he bought her better butter;
Then his wife made better batter
And all bit her biscuits but her.

* * *

An Appeal to Salvage Readers

Some time ago the following communication was received in this office, followed a week or so later by another from the original inquirer, solving a portion of the enigma. The one vital question still remains unanswered. Can any of our readers end our sleepless nights by forwarding to us the correct reply? The letters follow:

Oct. 4, 1921

Messrs:

No. 1—Can personal magnetism be measured?
No. 2—Can electrical energy in the body be measured?
No. 3—Can magnetism be conducted over wires and how far?
No. 4—How far can it be conducted successfully?
No. 5—What kind of instrument is used to measure magnetism?

Sincerely,

_____.

Nov. 16, 1921.

A month later came this:

Dears:

Some time ago we wrote you asking 5 questions in reference to personal magnetism. Since which time we **have answered** 4 of said questions satisfactorily to ourselves—Nos. 1, 2 and 4 by the affirmative "Yes" and No. 5 by making the instrument to measure it. However No. 3, "What size wire is used to conduct electricity in such small quantity as is developed in the human system?" **is still unanswered.** Can you give us, or secure for us an answer to said question and greatly oblige,

Yours very sincerely,

_____.

* * *

Municipal Ownership Means Strenuous Days

We learn from "Denkinotomo," published in Tokyo, that in celebration of the taking over of the street railways by the municipality ten years ago, there has been "arranged to have 'Strenuous Day,' lasting a week, during which period the employes were requested to take especial care to avoid any possible danger and other troubles liable to occur on the road." According to Webster's dictionary, strenuous signifies "marked by zealous striving"—and we judge from the further comment in the Japanese press that "the result was claimed to be effective" that the day was successfully stretched to cover the major portion of the week at least.

* * *

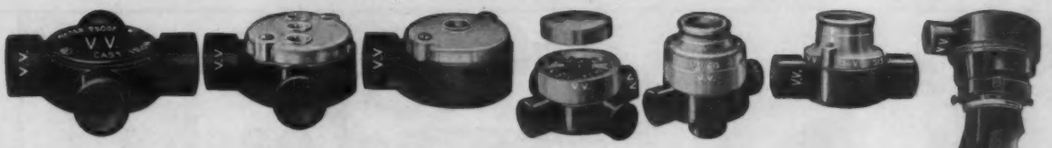
ELECTRICAL HYBRIDS

XVIII — The Heating Device President

The new device president sat in the chair
Growing hotter and hotter and hotter.
Though not given to gas, he was known for hot air
And never cooled off till he'd gotter.

His connections had power to keep wires hot;
When the house was old-fashioned, they wired.
That his power was bought, it was whispered a lot—
Yet it is true that he never was fired.

"V. V." FITTINGS



A Page for the Contractor-Dealer Enthusiast to Study

EVERY job requires some fittings—yet every job is different and you are up against the question of waiting for delivery or carrying a big stock of fittings. What you need to be in a position to handle every job quickly—without waiting is the flexible TYPE "5-ROUND SERIES LINE."

In this line the fittings are made in 3 sizes, each size being made for ½", ¾" and 1" conduit. Each size is made in 8 to 10 types thus, with the covers, thousands of different combinations are possible.

It means you only have **one type** to stock enabling you to make any combination. Standard Package Quantity consists of 250 fittings assorted.

Think of it—

No Special Fittings Required.

Thousands of Combinations possible. Any type of cover or attachment can be adopted to the same base.

Vapor proof fittings—Hubbell Plugs, Weatherproof Snap Switch fittings, Receptacles, Snap Switches, Lamp Guards, in fact any round base fitting thats made.

Write us for more information—Get our new folder

"THE ROUND SERIES LINE"

BAKER-JOSLYN COMPANY

Wholesale Distributors

LOS ANGELES SAN FRANCISCO, CAL. SEATTLE

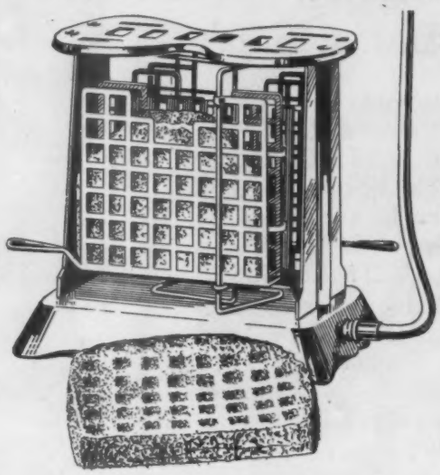
We Have "Put It Across"

The

Reverso Electric Toaster

(Patented Nov. 16, 1920)

Wherever offered it is the admitted Leader of All Toasters in sales and in satisfaction to the customers



There is no need to touch the bread from the time it is put in until it is perfectly and evenly toasted.

No danger of burning the hand.

No Springs or Catches to get out of order.

An appetizing effect is produced by the handsomely designed slice-holder.

This toaster has never been advertised until this year, but its operation is so "compelling" that we have never until now been able to fill all orders, but now our recent increases in capacity warrant publicity and a selling campaign.

Write us for literature and prices

The Electro Weld Company

70 Monroe Street, Lynn, Mass.

Pacific Coast Representatives: Western Agencies Co., Los Angeles, San Francisco, Seattle

REMEMBER, *this is the only real reversing toaster, and its name is*

REVERSO

Solve the Problem of More Outlets with National Metal Molding

The West is rapidly expanding electrically. Requirements for adequate wiring, outlets and receptacles are growing at an ever increasing rate.

The one logical solution to the problem lies in the hands of the Jobbers who sell and the Contractors who install National Metal Molding—the simplest, quickest and most thorough way of rewiring the older homes, offices and shops. Metal Molding is easy to work with and gives results that are a continual source of profit and satisfaction to both the customer and the contractor.

Write for the National Metal Molding Handbook "For the Man on the Job." It should be in the hands of every contractor and wireman.

National Metal Molding Co.

Fulton Bldg., Pittsburgh, Pa.

Pacific Coast Representatives:

GARNETT YOUNG & COMPANY

San Francisco Los Angeles Seattle Portland

"Brings Electricity Where Needed"

EVERY service which is performed electrically on the modern farm or ranch is provided for in the R & M line of farm motors. R & M 32-volt direct current motors for private plant service and alternating current motors for high line service are finding a ready sale in every prosperous agricultural community. Distributors and dealers who are following up this class of business are finding it well worth going after.

The R & M line of farm motors is advertised dominantly in the leading farm publications, and dealers and distributors are provided with attractive sales literature for local advertising.

THE ROBBINS & MYERS COMPANY
SPRINGFIELD, OHIO BRANTFORD, ONTARIO
Pacific Coast Office—701-702 Rialto Bldg., San Francisco

Robbins & Myers Motors

Announcing an Entirely New Quality Iron at a Popular Price

A winning combination of appearance and construction is found in our new and improved Sheldon Iron. It means quick sales and large profit for you.

Easier Sales and Bigger Sales

THE New and Improved Sheldon Electric Iron is easier to sell and vastly more profitable than any electric iron you have ever handled.

It is a **QUALITY** iron first and foremost, embodying many new and unusual features in design and construction. Yet it sells at a **POPULAR** price within the means of the majority of buyers.

Our sales proposition is attractive and extremely profitable to the dealer. Sheldon Irons move from the dealer's counter with less sales effort assuring a more rapid turnover and consequently increased profits.

ITS BEAUTY APPEALS TO EVERY WOMAN

ITS CONSTRUCTION IS APPROVED INSTANTLY BY DEALERS

Place your order for Sheldon Irons today
Don't hesitate — Act NOW

Casey-Sheldon-Foster, Inc.
165 High Street, Boston, Mass.

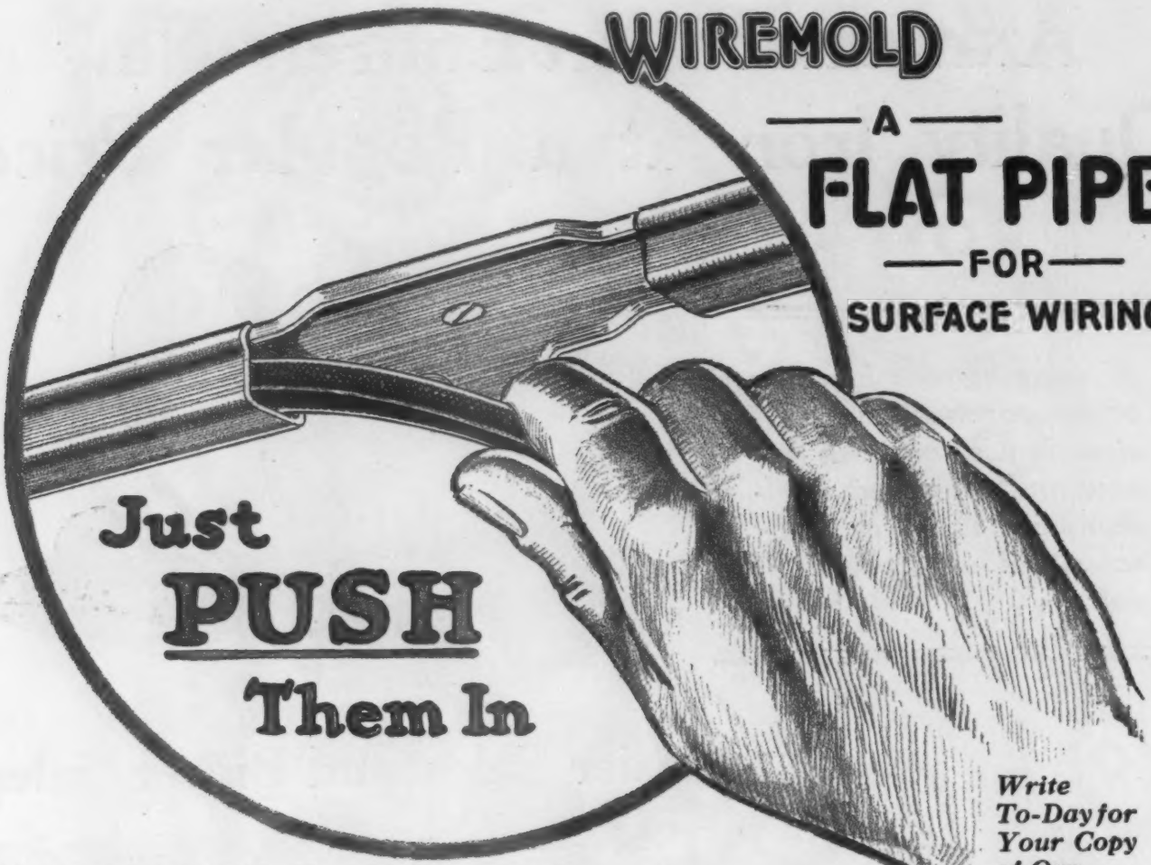
Pacific Coast Representative

JAMES F. KINDER

Concord Building, Portland, Oregon

THE NEW SHELDON IRON

WIREMOLD
—A— FLAT PIPE —FOR— SURFACE WIRING



Write To-Day for Your Copy of Our Catalogue

YOU SIMPLY PUSH
* * *
WIRE INTO WIREMOLD
* * *
FOR ITS BASE AND
* * *
CAPPING ARE ROLLED
* * *
TOGETHER TO STAY
* * *
AND TO MAKE A FLAT PIPE
* * *
THAT GOES UP IN ONE PIECE
* * *
LIKE RIGID IRON CONDUIT
* * *
RATHER THAN IN TWO PIECES
* * *
LIKE OLD FASHIONED MOLDINGS

WIREDUCT

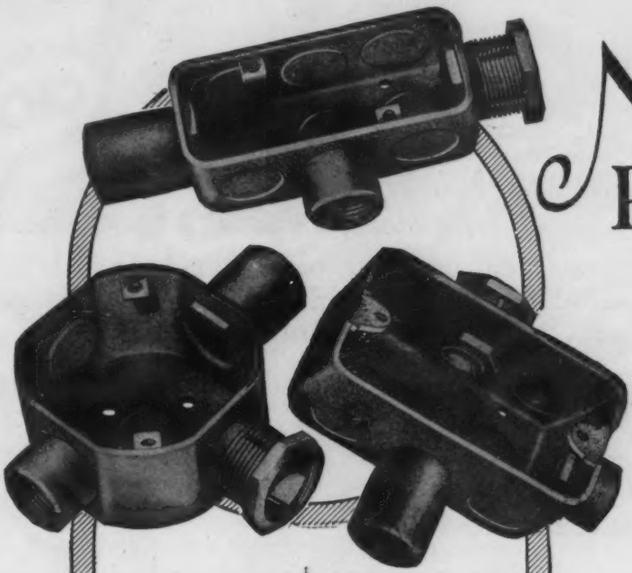
WIREDUCT
WIREDUCT
WIREDUCT
WIREDUCT
FOR CONVENIENCE CUT OUT THIS CIRCLE WITH YOUR KNIFE AND PULL WIREDUCT OUT THRU THE HOLE

THE LOOM THAT COMES A-COIL-TO-A-BOX

THE
AMERICAN WIREMOLD COMPANY
HARTFORD, CONN.

Represented in Southern California by
J. G. POMEROY
833 SAN FERNANDO BLDG.
LOS ANGELES, CAL.

Represented on Northern Coast by
GEORGE A. GRAY COMPANY
589 MISSION ST.
SAN FRANCISCO, CAL.

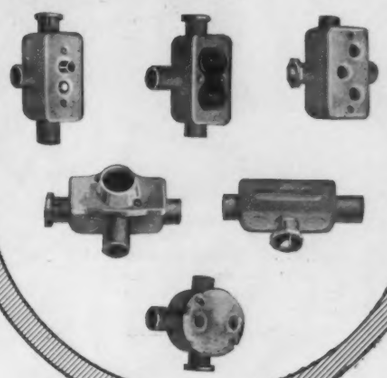


Nothing Experimental about AUSTIN BROWNIE BODIES

Brownie Box Connector. For connecting conduit to Brownie Bodies. Connector is held into box by Locknut and the body of Connector has a female thread, into which may be screwed any one-half or three-quarter-inch rigid conduit.

Brownie no-thread box connector. For connecting conduit to Brownie Bodies. Connector is held into box by Locknut. The no-thread patented feature eliminates the necessity of threading conduit. Simply cut off conduit to the desired length, slip it into the body of connector, tighten the Locknut and you have an absolute hold.

An ordinary Austin conduit nipple, together with a regular conduit coupling, makes a very neat connector for coupling conduit to Brownie bodies or any outlet box.



Brownie Bodies have been used for years, by all the leading contractors in the country.

They stand for simplicity in themselves. The combination of three pressed steel bodies, three connectors and a few carefully designed covers, make up this complete line of Brownie Bodies, which will answer every conceivable job for exposed wiring.

It does not require a big investment to carry a complete stock.

If you are not among the thousands now using Brownie Bodies, try them and we are sure that you will agree with us that this line is by far superior to anything of its kind on the market.

THE M. B. AUSTIN COMPANY
108-116 So. Desplaines St. Chicago

Pacific Coast Representatives

GEO. A. GRAY COMPANY
589 Mission Street
San Francisco, Calif.

J. G. POMEROY
833 San Fernando Bldg.
Los Angeles, Calif.

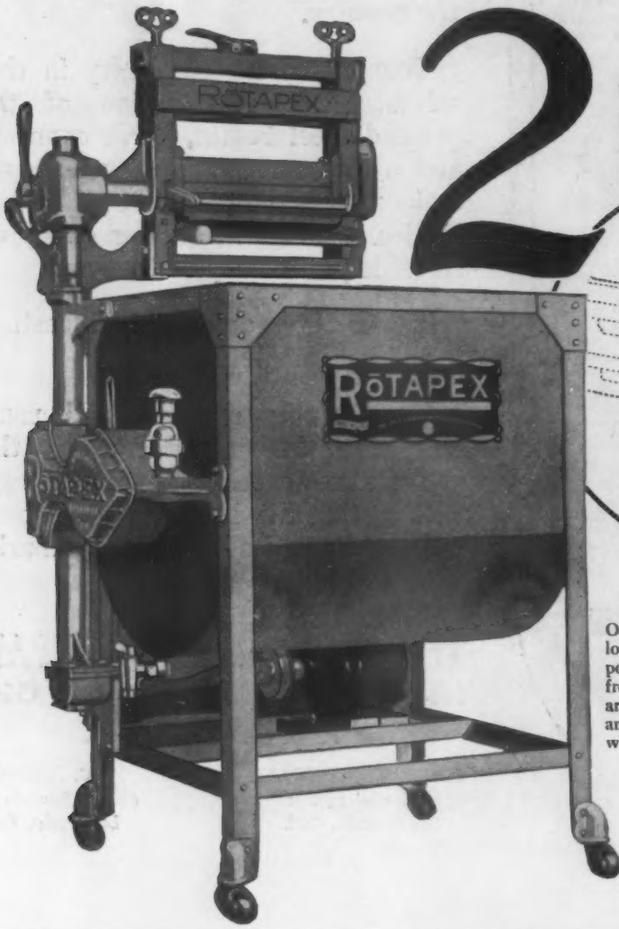
RŌTAPEX
ELECTRIC CLOTHES WASHER

FEW women have a mechanical training, but most husbands have gained a practical knowledge of engineering and machinery through their study and comparison of motor cars.

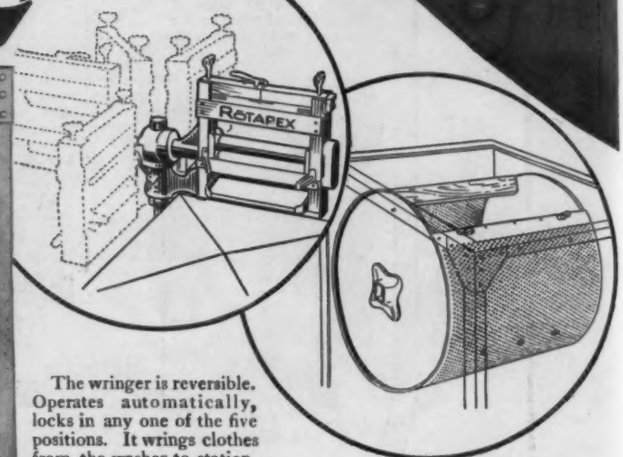
When the husband must be sold, the dealer who handles the APEX Electric Suction Cleaner and the ROTAPEX Electric Clothes Washer has a big advantage.

The APEX inclined, divided nozzle is so far in advance of any other suction cleaner nozzle that it is practically lifted out of all competion.

The switch in the handle is as convenient as steering-wheel control of the gas and spark. The weight of the motor and nozzle is perfectly balanced by being carefully distributed over the three wheels. The simple adjustment for raising or lowering the nozzle for long nap carpets or bare floors gives the APEX the widest possible range of



2 TWO OF THE MANY RŌTAPEX FEATURES



The wringer is reversible. Operates automatically, locks in any one of the five positions. It wrings clothes from the washer to stationary tub, from one tub to another, from tub to basket without moving the washer.

The counterbalanced cylinder is made of heavy zinc with galvanized ends. It measures 18 inches in diameter by 18¾ inches long. Its tumbling ribs are of wood—its entire construction rustproof.

Apex
ELECTRIC SUCTION CLEANER

service and efficiency, while another convincing proof of its correct design is its light weight — only 10½ lbs.

Motor-wise husbands are also quick to grasp and to endorse the construction of the ROTAPEX Electric Clothes Washer. "A fine job!" is their invariable comment after inspecting its transmission, the friction clutch motor, its universal jointed shaft, the precisely cut gears of genuine bronze, the armored wiring and covering of every moving part, the conveniently located starting and stopping switch, the ball-bearing casters, the large capacity counter-balanced cylinder, the detachable power wringer that operates only when it has locked automatically into one of five different positions. Here, indeed, is a washer built to last and give life-long service whether in a cottage or a big hotel.

In your own interest you ought to investigate the APEX-ROTAPEX proposition. Full information and terms will be sent promptly if you will write.

THE APEX ELECTRICAL DISTRIBUTING CO. 1067 East 152nd St. **CLEVELAND, OHIO**

EXPORT OFFICE AND SHOW ROOM: 461 Eighth Avenue, NEW YORK CITY, U. S. A.

Canadian Factory: APEX ELECTRICAL MANUFACTURING COMPANY, LIMITED, 102-4 Atlantic Ave., Toronto, Ont.

2 TWO Apex EXCLUSIVE FEATURES

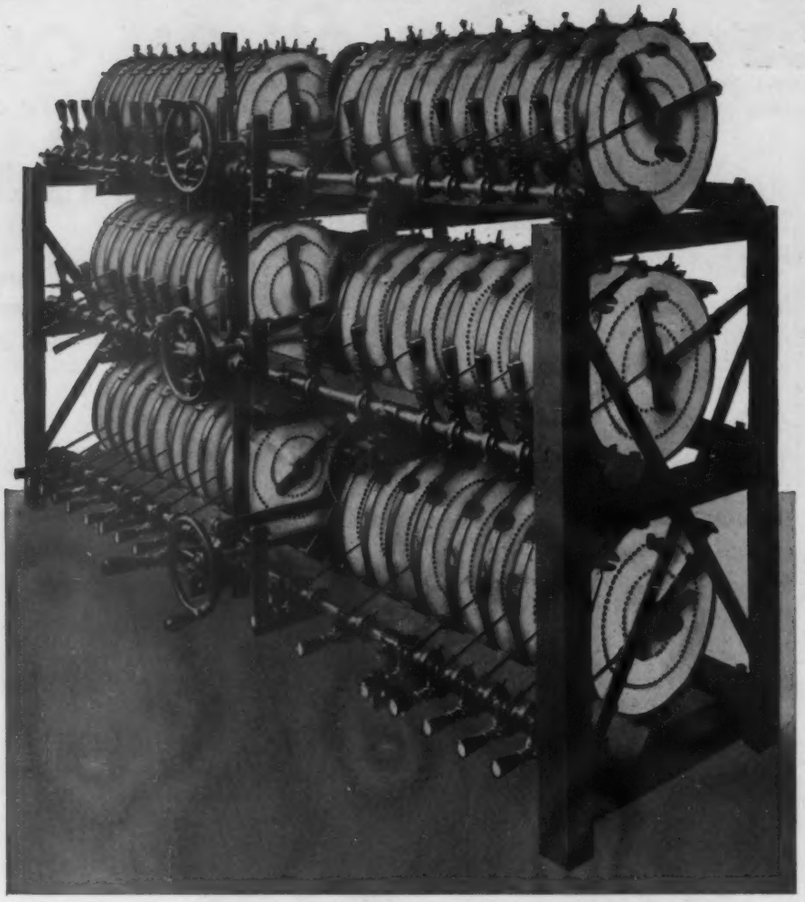
2

1. INCLINED NOZZLE.
The APEX Nozzle pokes under radiators and low furniture and into corners inaccessible to other cleaners or a broom.

2. DIVIDED NOZZLE
The APEX Nozzle is equally divided to give the same maximum suction power at the extreme ends as in the middle, maximum efficiency at every point of its 13-inch opening. A patented feature.

Ward Leonard

Theatre Dimmers



Ward Leonard Theatre Dimmer Bank built for an Australian Theatre

The original plate form — Standard the world over

The only dimmer made with Vitrohm — Vitreous enamelled insulation—the impervious insulation which prevents oxidization of resistance element.

Vitrohm also holds the joint between resistance wire and terminal lead, so that connections cannot become loosened or changed.

Ward Leonard Theatre Dimmers afford perfect control, providing gradual, imperceptible change throughout the entire range of apparatus, without flicker or flash. They are compact in design and therefore economical in space requirements. Moreover they are very much lighter than other dimmers of the same capacity.

Ward Leonard Theatre Dimmers can be made to meet any condition as to arrangement of levers and location of plates. Remote control, top of switchboard, rear of board or wall mounting.

Large stock of standard size plates carried at factory to meet immediate demands.

Here are some theatres which are Ward Leonard equipped: New York Hippodrome and Century Theatre, New York City; Lomax Theatre, Columbia Theatre, Chicago; Hollis Street Theatre, Boston; Schubert Theatre, St. Louis, Mo.; Gayety Theatre, Detroit, Mich.; Gayety Theatre, Winnipeg, Man.; Dupont Theatre, Wilmington, Del.; New Theatre, Davenport, Iowa; Poli Theatre, Springfield, Mass.; Germantown Theatre, Philadelphia; Granada Theatre, San Francisco.

ELECTRIC MATERIAL CO.
589 Howard St., San Francisco Title Ins. Bldg., Los Angeles

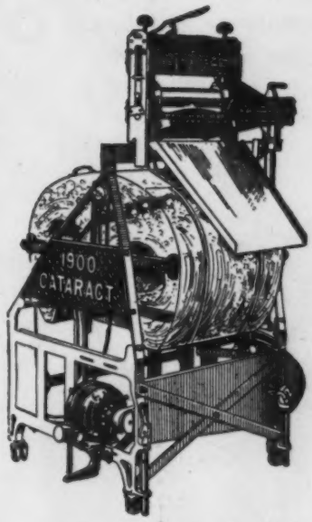
Agt. for Ward Leonard Electric Company (Mount Vernon, New York)

2044

A STRONG FIGURE

When it comes to figuring on a washing machine—the figure 8! For it is the figure 8 of the 1900 Cataract Electric Washer that places the 1900 as leader.

This figure 8 is an exclusive 1900 Cataract Washer feature. By means of it, the soapy cleansing water swishes back and forth through the clothes in a figure 8 movement *four times* oftener than in the ordinary washer.



This phantom view of the tub of the 1900 Cataract Washer shows how the water swirls through the clothes in a figure 8 motion four times oftener than in the ordinary washer.

Not only is the 1900 Cataract Washer famous for its figure 8. It is also well-known for its sturdy copper tub devoid of all parts and cylinders to be lifted out and cleaned or to cause wear and tear on the clothes. And for the swinging reversible wringer that also works electrically.

Our stupendous national advertising campaign has created a big demand for the 1900 Cataract Washer.

The 1900 Cataract Washer is easily operated, and costs only a few cents an hour for electricity. It washes a tubful of clothes in 8 to 10 minutes.

1900 CATARACT WASHER

THE 1900 WASHER COMPANY
Binghamton, N. Y.

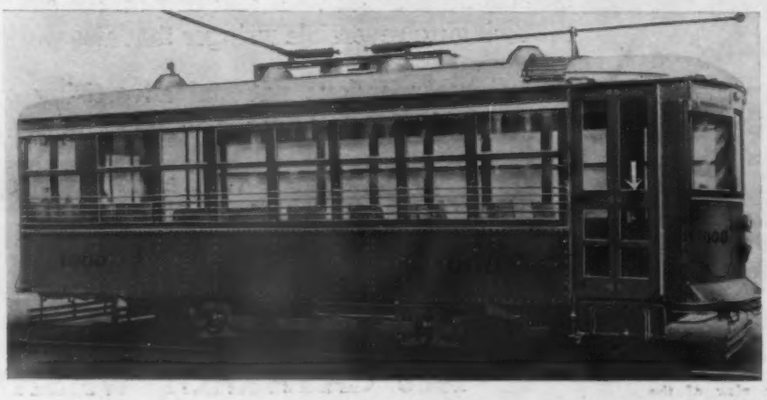
Canadian Office and Factory:
CANADIAN 1900 WASHER CO., 357 Yonge St., Toronto

REG. U.S. PAT. OFF.
"BIRNEY"
SAFETY
CAR

It Signifies Just This—

Every Safety Car having this monogram on its service door is a "Birney" car—from our Philadelphia Plant, American Car Company, St. Louis or Wason Manufacturing Company, Springfield.

That the American Car Company collaborated with Mr. Birney in developing this better service car, building the first order for Ft. Worth, Texas, and that it was the originator's ingenuity which has made it possible for street railways to operate more cars at less expense, provide better service and to increase earnings.



THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. ST. LOUIS MO. — G.C. KUHLMAN CAR CO. CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.

Dont Punch Holes in the Umbrella

An Editorial Reprinted from Electrical Merchandising

By Frank B. Rae, Jr.,

IF the umbrella we are carrying begins to leak, we do not punch it full of holes and destroy all the umbrella shops in town. We have more sense than that. And yet, indirectly, we are guilty of acts quite as vindictive and absurd.

For example, concerning the electric light company. It isn't always the best company in the world. It is a monopoly, and people who work for monopolies have an irritating way about them sometimes. You have to deal with them whether you like them or not, and they know it, and so they become abrupt and arbitrary, and you get exasperated and angry.

THEN along comes a vote-seeker. He knows how folk feel toward the electric company. It's his business to get votes, and if he can get yours by cussing the company, he'll cuss as loud and long as you care to listen. If he needs your vote real badly, he will promise to do something to hurt the company—in other words he'll promise to punch holes in the leaky umbrella.

Now, the electric company is providing a necessity of life. It provides light and electric service for our homes and streets, for our offices and shops. It provides heat for cooking and ironing. It provides power without which many of our factories could not run.

As a general proposition the electric company is doing a good job for the community. It is one of our biggest civic industries. The people who run it are about as good as the most of us.

AND the business of making and distributing electricity is a hard business. It is highly technical. You expect to have the light flash on whenever you touch a button, yet if you knew all the intricate and delicate machinery and apparatus required to give you this instantaneous service, you would be aghast with wonderment.

We need the lighting company in our business. You need the lighting company in *your* business. We ask our friends to help us to make it a bigger and better company. For the bigger the company is, the more people it can serve; and the better it is, the better it will serve us all. The first step toward getting more service and better service is to quit punching holes in the umbrella and to stop inciting the politicians to burn down the umbrella shops!

ROYAL
QUALITY SERVICE

CLEANS BY AIR—ALONE

Air-alone cleaning with the Royal is thorough yet gentle. The Royal has none of the faults of the motorized carpet sweepers. It is the true type of electric suction cleaner, developed past the point of relying upon mechanical friction to perform its thorough cleaning service.

THE P. A. GEIER COMPANY, *Manufacturers of* Royal Electric Cleaners, Vibrators and Washing Machines
5113 St. Clair Avenue Cleveland, Ohio

ANACONDA
BARE COPPER WIRE AND CABLE

"From Ore to Finished Product"

The Significance of Our Slogan:

Mined at Butte, Smelted at Anaconda. Refined, Rolled and Drawn at Great Falls, the whole process of producing our copper products is carried on by Anaconda workmen, on Anaconda property and in Anaconda mills.

RELIABLE SERVICE IS THE RESULT

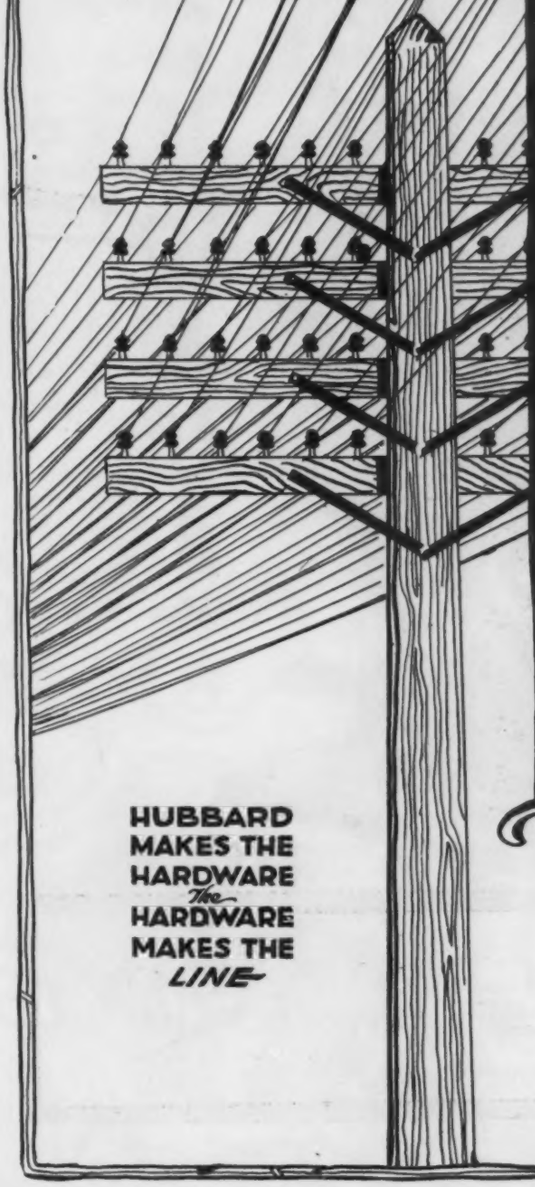
ANACONDA COPPER MINING COMPANY
ROLLING MILLS DEPARTMENT
General Office
111 W. WASHINGTON ST. CHICAGO

EXCLUSIVE SELLING AGENTS FOR THE PACIFIC COAST.

Pacific States Electric Company

San Francisco Portland Los Angeles Seattle Oakland

HUBBARD



HUBBARD MAKES THE HARDWARE *The* HARDWARE MAKES THE *LINE*

In this period of transmission line development, it is well to bear in mind that the name

PEIRCE

stamped on Hardware Specialties, designed for both primary and secondary installations means that your materials are the best it is possible to make—or buy.

HUBBARD & CO.
Pittsburgh, Pa.

Stocks carried in the warehouses of our

Pacific Coast Distributors

Pacific States Electric Company

Los Angeles	San Francisco
Oakland	Seattle
Portland	Spokane

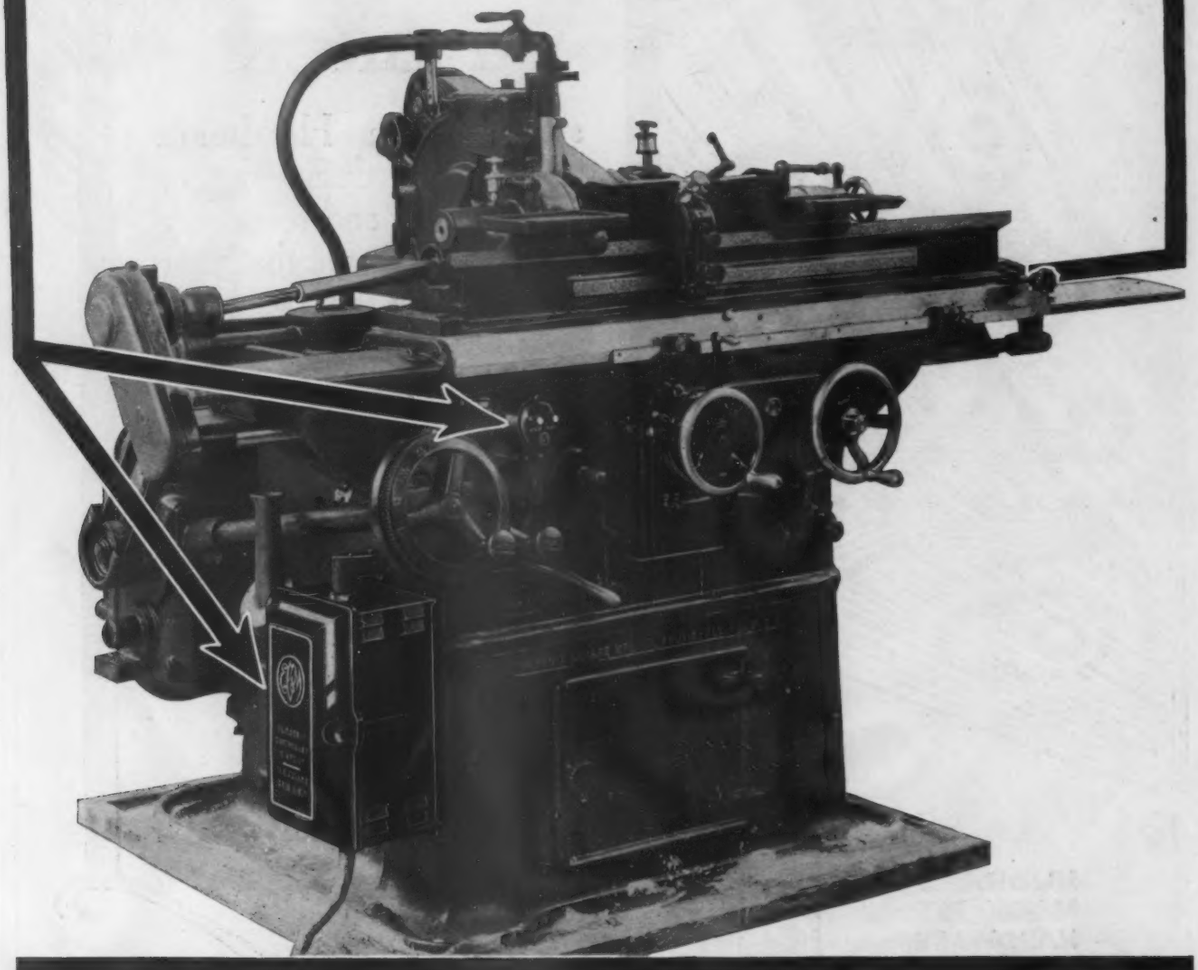
ZB starting a Grinder

The ZB Starting Switch shown on the grinder below is only one of a large number installed by The Toledo Steel Products Co. on similar machines.

It is push-button operated and protects the motor against overload, lost phase and no-voltage.

Its installation is inexpensive and its operation so simple, merely pushing the button, that a child could start and stop this machine.

Write for Bulletin 1044



THE ELECTRIC CONTROLLER & MFG. CO.

CLEVELAND, OHIO

FOR SOUTHERN CALIFORNIA: O. E. THOMAS, WASHINGTON BLDG., LOS ANGELES

FOR STATES OF OREGON AND WASHINGTON: W. MONTELIUS PRICE, SEATTLE, WASH.

FOR NORTHERN CALIFORNIA: C. F. HENDERSON, CALL BLDG., SAN FRANCISCO

ROME WIRE

Weatherproof Wire

Careful rolling, thorough cleaning, accurate drawing, and even annealing assure you the highest quality in electrical conductors entering into the manufacture of ROME WEATHERPROOF WIRE.

Tested for strength and quality, cotton yarn is rewound in our own plant, and the wire triple braided in one operation. High quality of yarn results in few breaks, and even, continuous braid.

The same fine care in saturation, finishing and polishing combine to render ROME WEATHERPROOF WIRE a "symbol of efficiency" in this type of electrical conductor.

Rome Wire Co. Rome N.Y.
"Diamond" Branch Buffalo N.Y.

Rome merit wins customers
Rome service holds them

2010-L

WIRE = ROME

Naraka

Naraka, the Hindu demon king, had 16,100 wives and eight principal queens. He was killed by Krishna who took Naraka's wives and so successfully multiplied himself by magic that each of the 16,108 imagined that she had him for her very own!

But such magic is no longer in vogue, and the average brush manufacturer who claims that his particular brush is the one which can successfully take care of any of the 16,108 station troubles is only deceiving those whom he ought to be serving.

How much better the Morganite way of looking into the trouble first, and then prescribing a brush which is specifically designed for the service!

Don't place your confidence in 'Krishna' brushes and then wonder why you have continued trouble.

Send for a Morganite engineer and be safe!

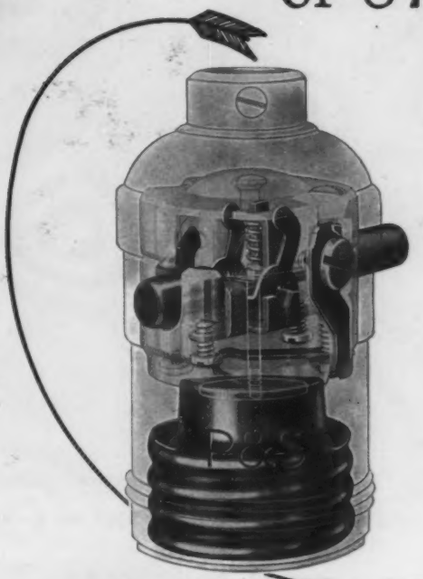
Morganite

Main Office and Factory:
The Morganite Brush Co., Inc., 519 W. 38th Street, New York City

Pacific Coast Engineers and Representatives—
Herzog Electric & Engineering Co., 150 Steuart Street, San Francisco, Cal.
Charles Farnham, I. W. Hellman Bldg., Los Angeles, Cal.
W. R. Hendrey Co., Hoge Bldg., Seattle, Wash.

Forty-eight Years

Five Times a Day or 87,600 Times



The Popular Push-Button Socket

For Portables and Dainty Boudoir Lamps

Quality that Lasts

P&S S-34 Push-Button Body—Operated 87,600 times at 3A.--250V.

This is equal to 48 years at the average of five operations a day

Order P&S Push-Button Sockets Now
Prompt Delivery

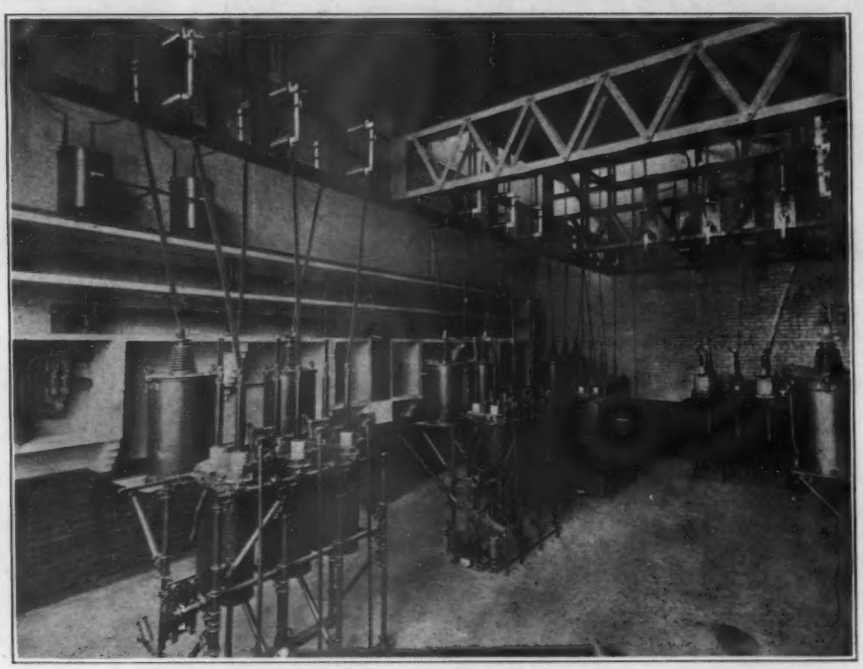
Made by

Pass & Seymour, Inc.

SOLVAY, NEW YORK, U. S. A.

HIGH TENSION EQUIPMENT

What Does Your Money Buy?



UNIT TYPE Disconnects and Bus Supports in 22000/2300 Volt Indoor Sub-station

A SOUND INVESTMENT?

THE money that goes into your station equipment is secured at considerable cost. It is too valuable to be merely spent—it must be wisely invested.

UNIT TYPE equipment represents the highest type of investment because it has a flexibility that effectively holds off depreciation costs. Being completely standardized, it permits of immediate shipments and shortens alterations or replacement delays.

THE RIGHT PRINCIPLE?

UNIT TYPE equipment is produced and sold on a principle that protects each customer's interests.

It is built as well as human skill can build it. Responsibility for quality exceeds every other responsibility in the DELTA-STAR organization.

ENGINEERING SERVICE?

THERE is a real reason why central station men are relying more and more on DELTA-STAR. It is that our engineers have had the necessary, specialized experience to enable them to make exact and effective recommendations.

Many purchasers have come to our factory to talk over their problems with our engineers. They have found an atmosphere of personal service that quite obviously pleased them.

Just send in your inquiries, specifications or orders—and get some real service.

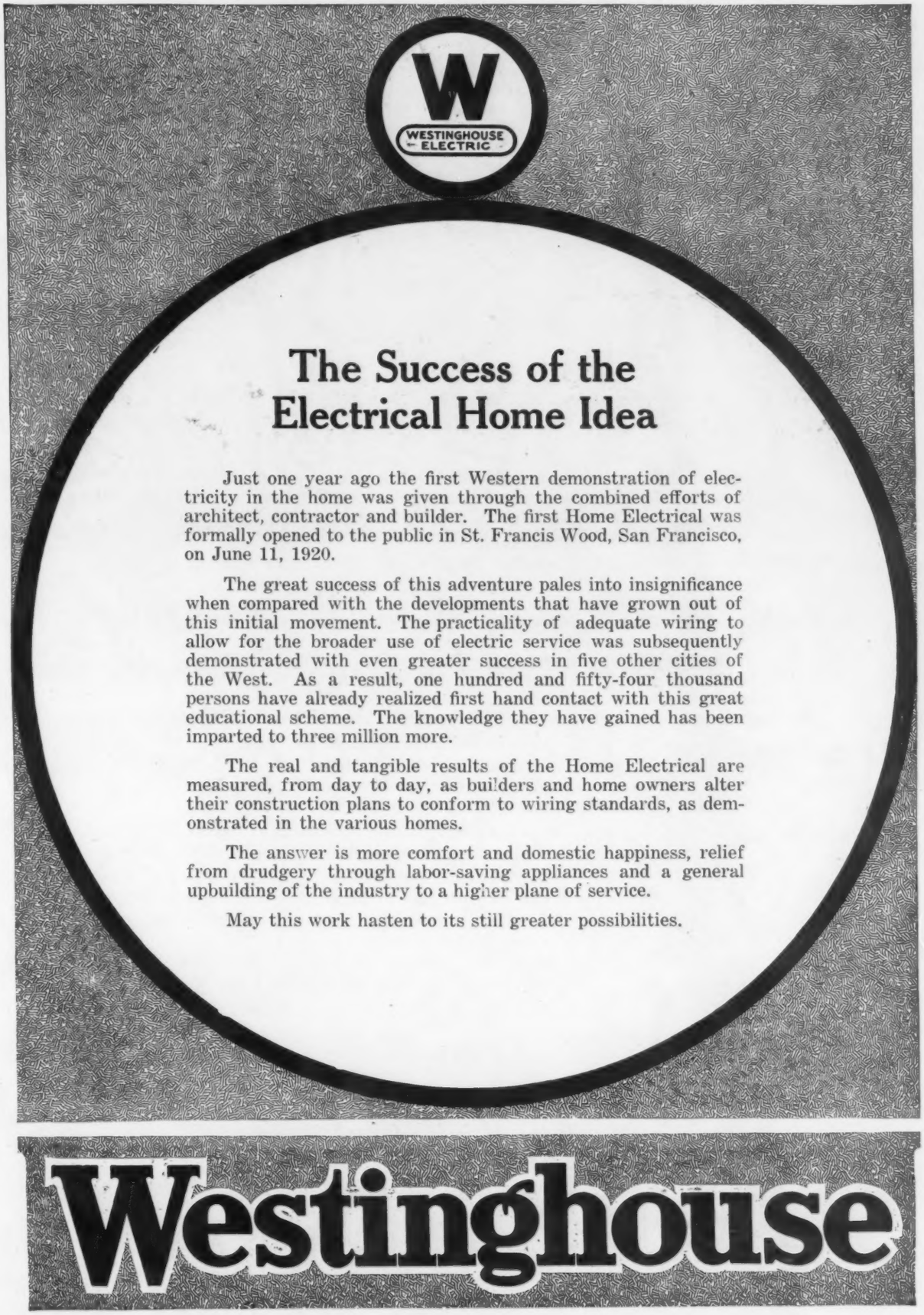
Delta-Star Electric Company

2433-59 Fulton St., Chicago, Ill.

LOS ANGELES	SALT LAKE CITY	SEATTLE
411 So. Main St.	59 Broadway	Hoge Building

DELTA-STAR HIGH TENSION EQUIPMENT

UNIT-TYPE INTERCHANGEABLE PARTS



The Success of the Electrical Home Idea

Just one year ago the first Western demonstration of electricity in the home was given through the combined efforts of architect, contractor and builder. The first Home Electrical was formally opened to the public in St. Francis Wood, San Francisco, on June 11, 1920.

The great success of this adventure pales into insignificance when compared with the developments that have grown out of this initial movement. The practicality of adequate wiring to allow for the broader use of electric service was subsequently demonstrated with even greater success in five other cities of the West. As a result, one hundred and fifty-four thousand persons have already realized first hand contact with this great educational scheme. The knowledge they have gained has been imparted to three million more.

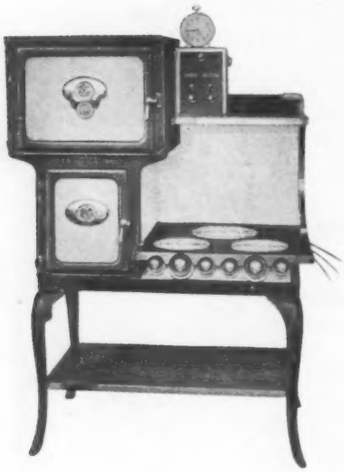
The real and tangible results of the Home Electrical are measured, from day to day, as builders and home owners alter their construction plans to conform to wiring standards, as demonstrated in the various homes.

The answer is more comfort and domestic happiness, relief from drudgery through labor-saving appliances and a general upbuilding of the industry to a higher plane of service.

May this work hasten to its still greater possibilities.

Westinghouse

A Result of Home Electrical Demonstration— Greater Electric Range Sales



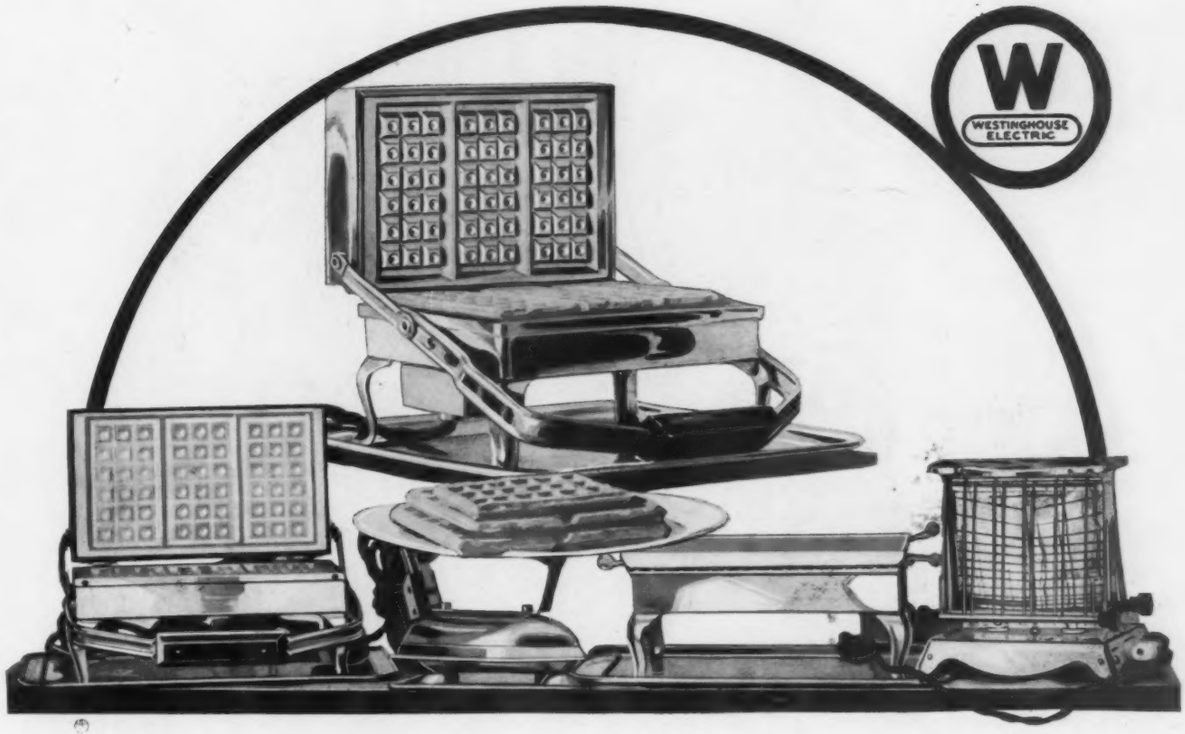
The comforts and conveniences of electricity have been realized to the extreme of possibility in the beautiful home of H. J. Gute, of Berkeley, California.

Among the electrical devices installed is a Westinghouse Automatic Electric Range, which forms an integral part of this home. It is believed to be the most completely wired residence known, containing sixty complete circuits and more than 175 outlets.

Such fine installations add to the prestige of the Westinghouse range and help to create still greater demand. Those who see this demonstration of efficiency become live prospects for the dealers who carry the Westinghouse heating line.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

Westinghouse



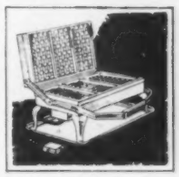
Adequate Outlets Are Boosting the Sale of Best Heating Appliances for the Table

Every western dealer will be quick to realize the possibilities for distribution of the Electric Waffle Iron, which has been added to the Westinghouse heating line.

Neat, but sturdy construction, with the ability to cook waffles faster and better at the table are outstanding features that make instant appeal to the customer.

Demonstrate this headliner in your store window along with the Westinghouse grill, toaster and other table appliances and the results will be pleasingly surprising. This kind of selling effort, coupled with Westinghouse service, will multiply your turnover and enhance the entire aspect of your sales sheets.

Convenient to Carry

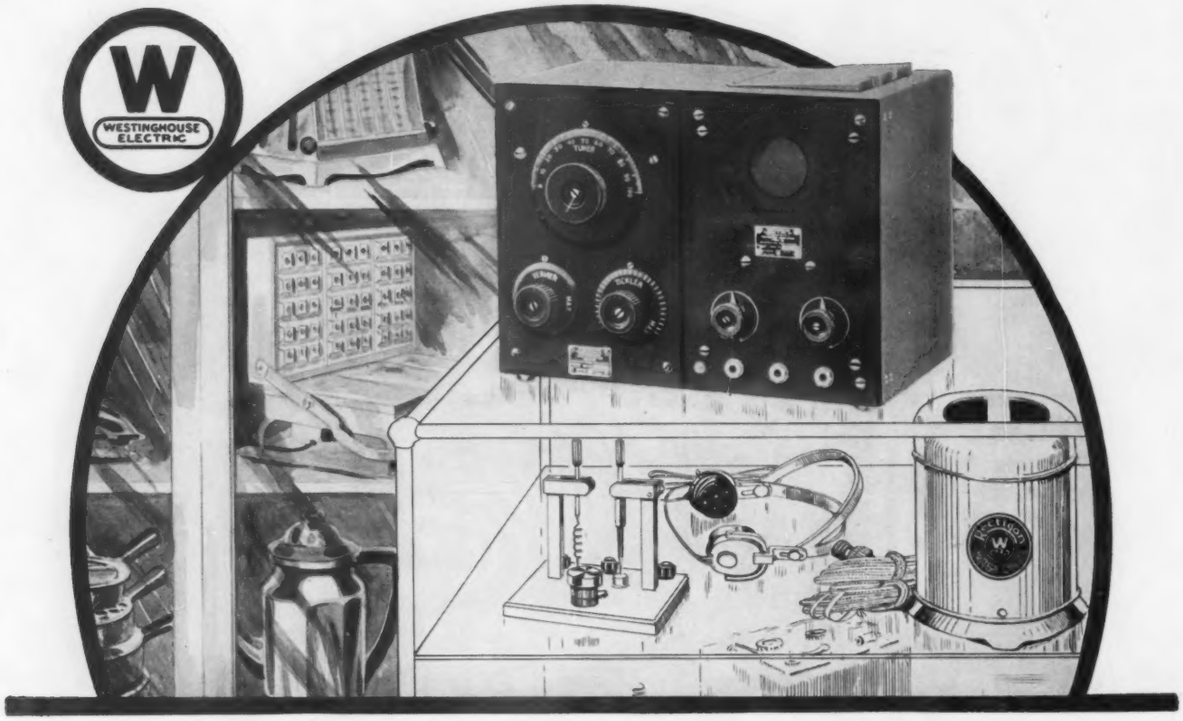


Permanent Cord Connection

Opened by Pulling Handle Forward

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

Westinghouse



Radio Enthusiasts Constitute Great Market for Radio Telephones and Equipment

Radio apparatus has long since passed the experimental stage: It is being put to more and more practical use as the merits and application of the apparatus become known.

With the advent of the radio telephone, business and professional men are turning to it as an interesting recreation. This method of advertising and news distribution is expanding: The army of radio enthusiasts is rapidly increasing with greater familiarity with the wonders of radio.

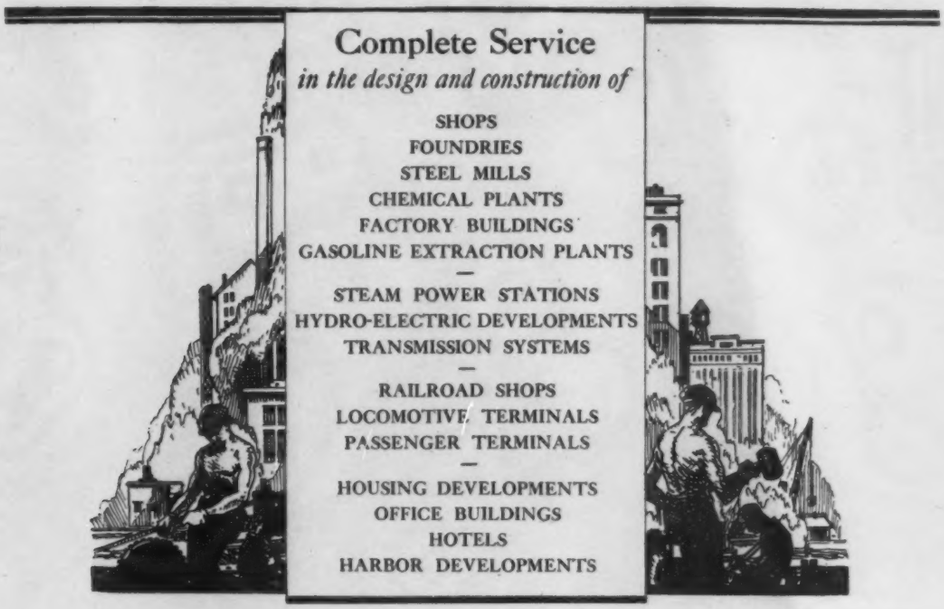
Westinghouse has sensed this big field and developed quality apparatus through which any dealer can build a profitable business. Stock this apparatus and make your store the center of radio interest in your community. Ask for more details.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pennsylvania

DISTRICT OFFICES
San Francisco, 1 Montgomery St.
Los Angeles, 7th and Spring Sts.
Seattle, Second and Cherry Sts.
Portland, Broadway and Morrison Sts.
Denver, 910 Fifteenth St.
Salt Lake City, 2nd South and Main Sts.

AGENT JOBBERS
Electric Rwy. & Mfrs. Supply Co., San Francisco
Fobes Supply Co., Seattle and Portland
Illinois Electric Co., Los Angeles
Intermountain Electric Co., Salt Lake City
Mine & Smelter Supply Co., Denver
Montana Electric Co., Butte, Montana
The Washington Electric Supply Co., Spokane

Westinghouse



COMPLETE SERVICE

Our service on any construction undertaking is *complete.* By this we mean that when desirable we actually perform every part of the work with our own forces. We make investigations, reports and preliminary plans, and then design, construct and equip the work in its entirety.

This service includes not only the buildings and other structures involved in the general scheme, but also railroad sidings, sewer, water and electrical distribution systems, streets and sidewalks—in fact all facilities required to convert a vacant site into a modern plant completely equipped and ready to operate.

This *complete service method* is particularly advantageous for many reasons, not the least of which is the fact that our close central control of all parts of the work produces a smoothness and speed difficult to obtain when many organizations are at work on the same project.

We also construct from the plans of other engineers

DWIGHT P. ROBINSON & COMPANY
INCORPORATED

Engineers and Constructors

With which is consolidated WESTINGHOUSE, CHURCH, KERR & COMPANY, Inc.

Electric Equipment Building, Los Angeles

NEW YORK CHICAGO YOUNGSTOWN DALLAS MONTREAL

BRYANT
SUPERIOR WIRING DEVICES
The California Electrical Co-Operative Campaign, in the building of the five Pacific Coast "Homes Electrical," has proven to architects and home builders what the convenience outlet means in stimulating the sales of electrical merchandise for the homes electrical in the West.
Bryant Wiring Devices are squarely behind this movement.
2089
With the continually growing use of appliances, Duplex Receptacles are demanded. Bryant Spartan Duplex Receptacle No. 122 takes tandem blade and standard attachment plugs. This Duplex Receptacle goes into a single gang box. Cat. No. 117 provides for a switch and receptacle where only a switch now exists. A rare opportunity for business in homes already wired.
THE BRYANT ELECTRIC COMPANY
BRIDGEPORT, CONN.
NEW YORK CHICAGO SAN FRANCISCO

JOURNAL OF ELECTRICITY
and WESTERN INDUSTRY

PERSONAL SERVICE

"SEARCHLIGHT"

MARKET PLACE OF THE PACIFIC

USED EQUIPMENT

POSITIONS OPEN—Business Opportunities and other undisplayed ads, 6 cents a word, minimum $1.25 an insertion.

POSITIONS WANTED—Evening work wanted, tutoring and other undisplayed ads of individuals looking for employment, 4 cents a word, minimum 75 cents, **payable in advance.**

PROPOSALS—Advertisements for bids, 40 cents a line.

ADD 5 WORDS for box number in undisplayed ads if replies are to any of our offices. There is no extra charge for forwarding replies.

DISCOUNT OF 10% if one payment is made in advance for 4 consecutive insertions of undisplayed ad.

ADS IN DISPLAY TYPE—Space is sold by the inch (30 in. to a page), the price depending upon total space used within a year, some space to be used each issue.

RATE PER INCH for ads in display space:

1 to 4 in., $3.50 an in. 30 to 59 in., $3.20 an in.
5 to 10 in., $3.40 an in. 60 to 99 in., $3.10 an in.
11 to 29 in., $3.30 an in. 100 in. or more $3.00 an in.

POSITIONS OPEN — EMPLOYMENT — POSITIONS WANTED

POSITIONS OPEN

WANTED—Experienced engineer for superintendent of Hydro-Electric Plants—West Indies, healthful location. Only engineer who has had experience in handling men and Hydro-Electric construction should apply. Must be electrical engineer, resourceful and energetic. In reply, give age, weight, height, nationality, number and age of children, and photograph. Interview can be had in New York. Address, P-36, Journal of Electricity and Western Industry.

METERMEN

wanted everywhere. Demand exceeds supply. Our course in electrical meter engineering qualifies you for responsible position. Our graduates are our best recommendations. Employment service free. Write for special offer. Fort Wayne Correspondence School, Fort Wayne, Ind. Dept. J.

FOR SALE

FOR SALE—Two General Electric motors, type 1, 35-A, 1200 r.p.m., form K, 60-cycle, 35 hp., voltage, 2200, with compensators. Big Pines Lumber Co., Medford, Oregon.

Get your Wants into the Searchlight

125-kw., G. E. Turbo Set, 220-v. direct current.

150-kw., G. E. 3-Wire Generator. Direct current, 250-125-v.

100-hp. Westinghouse Motor, variable speed, continuous duty, 720 r.p.m., 440-volt.

100-kw., 550-v., direct current Generator.

All in Stock. Immediate Delivery

C. W. KING CO.
Rialto Bldg. San Francisco
Phone Sutter 2028

900 MECHANICAL Movements and 50 Perpetual Motions illustrated and explained in my book.

INVENTOR'S UNIVERSAL EDUCATOR

5th Edition—Tells how to procure and sell patents. Government and other costs. Covers the matter from A to Z—160 pages—Elegantly bound. Contains noted decisions of U. S. Supreme and State Courts on Patent cases. Mechanical Movements greatly assist inventors—suggest new ideas that might prove of great aid in perfecting inventions. Tells how to select an Attorney. Has valuable information regarding Patent Sharks, Selling Agents and promoters. Price $2. Postage free everywhere.

FRED G. DIETERICH
601 Ouray Bldg., Washington, D. C.

POSITIONS WANTED Ads

reach employers of technical men on the Pacific Coast. Use the

SEARCHLIGHT SECTION

"SEARCHLIGHT"

is

Opportunity Advertising

—to help you get what you want.

—to help you sell what you no longer need.

Take Advantage Of It

For Every Business Want

"Think SEARCHLIGHT First"

At Your Service—

A service wherein the man who is seeking a position or the man who is desirous of obtaining trained men; where information can be found concerning either the purchase or disposal of new and used electrical equipment. The purpose of the *SEARCHLIGHT* section of the *Journal of Electricity and Western Industry* is to render this service. It simply remains for the men in the electrical industry in the West to apply this service to their needs.

For Every Business Want—Think *Searchlight* First

Ready Reference for Western Buyers

Electric Appliance Co.

SAN FRANCISCO

JOBBERS OF ELECTRICAL AND AUTOMOBILE SUPPLIES

DISTRIBUTORS FOR

Packard Lamps
Parac Rubber Covered Wire
"O. K." Weatherproof Wire
Eden Washing Machines
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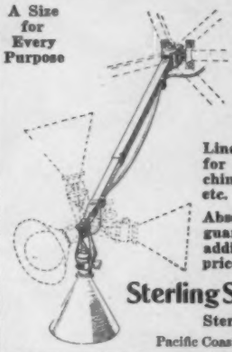

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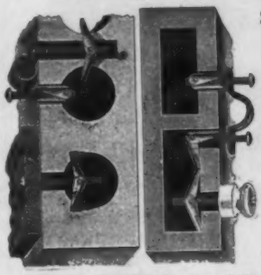
"THE PRACTICAL TOGGLE"



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Electrical supplies for every requirement

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817-19 MONADNOCK BUILDING
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THE RED BANDS OF HOWELL ARE YOUR ASSURANCE OF LONG-CONTINUED SERVICE

Five distinct features which assure dependability and never-faltering service—and which have established Howell Red Band Motors as most effective and efficient equipment, both mechanically and electrically, in the poly-phase motor field are:

(1) Double cotton enameled wire.
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Sizes of Howell Electric Motor are one to one hundred horse power,

Write or wire your requirements.

GARLAND-AFFOLTER ENGINEERING CO.
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HIGH GRADE MACHINERY

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Suitable for any height or site
Cheaper than earth dams
Stronger than solid masonry
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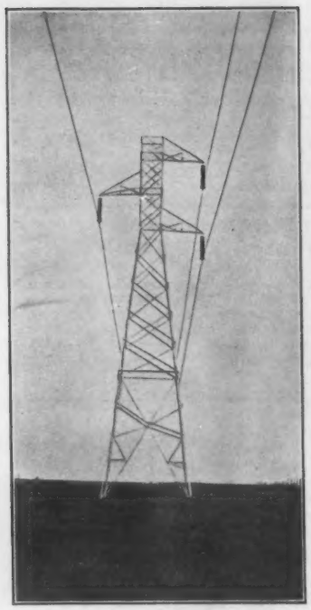
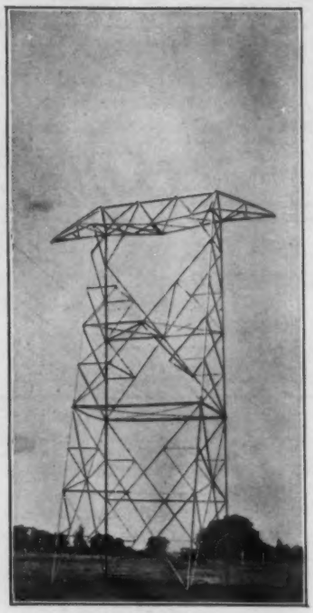
PROFESSIONAL CARDS in the DIRECTORY OF ENGINEERS in the *Journal of Electricity and Western Industry* are read by a large number of men who are either in present need of or who in the future will need engineering services. If your card is not in this Directory we suggest that you write for our rates at your earliest convenience.

Lowering the Costs of High Tension Transmission



Valley Tower

River Tower



Snow Tower

TRANSMISSION line voltages are pushed up principally with the object of reducing the costs of transmitting large blocks of power. When initial savings in transmission line costs may be made through the use of special Tower Steel, greatly added benefits accrue.

Substantial savings are accomplished with Pacific Coast Steel. The guaranteed high elastic limit, together with greater ductility and elongation, permits the use of much lighter towers. A lower cost per tower at the mill and lower freight and erection costs naturally follow.

One factor which makes such high quality and lowered costs possible is the complete manufacturing process at one plant. Pacific Coast Steel is rolled, fabricated and galvanized at the same mill where it is made from pig iron and high grade scrap in open hearth furnaces. Three typical Pacific Coast Steel Company high tension transmission towers are shown above.

Pacific Coast Steel Company

Manufacturers of open hearth steel structural shapes, merchant and reinforcing bars

General Offices: Rialto Bldg., San Francisco **Works at San Francisco, Portland, Seattle**

"Door-bell Massage"
. . . the A B C pictorial sales slogan for 1921.

A B C ... A Complete Line

Soundly Backed by a Veteran Maker

AS OCCURS in every new industry, today there are innumerable beginners foisting experimental electric washers upon dealers in the hope of securing an eventual foothold. Woe betide those dealers who lend ear to the honeyed promises of inexperience and allow the siren of prices based on visionary rather than actual cost to lure them!

For a year hence, the mortality among these hopefuls will have sorely embarrassed many of those dealers who succumb now to the wiles of temporary new makers. How can these new factories produce and sell good appliances for less than the large veteran establishments with their big outputs?

Obviously they cannot do so and long remain in business. It is better for dealers to take on only such lines as are already soundly entrenched.

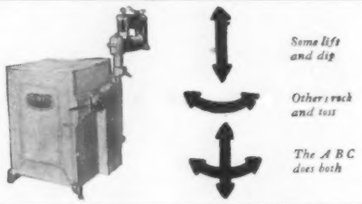
The A B C is such a line—backed by veterans in the industry, the great twelve year old, $2,000,000 factory of Altorfer Bros. Company.

[OVER]

A B C *Electric Laundress*

The Only Complete Line Under One Nationally Advertised Name

At a retail price range from $65 to $170, there are A B C power washers, electric washers and electric ironers. A model to suit every purpose and purse! No need to tie up capital in several lines. No need to devote advertising space, time and energy to pushing more than one line. Reduce your investment, increase your turnover, lower your freight costs, secure longer discounts, by confining your selling to the A B C Line. Note its broadness below. Each model the leader in its class—*a fact!* Each bears the famous nationally advertised A B C name. Exclusive dealerships open. Write our nearest wholesale distributor, or us, for all particulars.

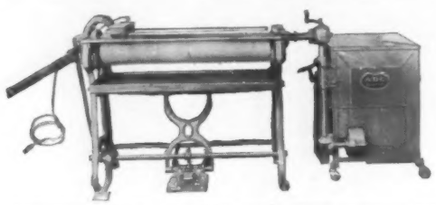


A B C Super-Electric Washer

Full Cabinet Washer that lifts and dips as do vacuum and cylinder types, that rocks and tosses as do the oscillators—you have three types in one. Copper or galvanized tubs. Maple or zinc cylinders. ¼ h. p. motor. Retail price range $155 to $170. (Semi-Cabinet Models, $135 to $150.)

A B C Electric Ironer

Foot pedals apply and release ironing pressure. 45-inch roll and shoe. One-piece steel ironing roll, 8-inch diameter, 7-inch non-warping ironing shoe. Result: faster, uniform work. Shoe drops back 3 inches. Enclosed parts. Retail price, equipped to operate off any A B C Electric Washer, $138. With motor, $170.



A B C Electric Laundress

Washes—Wrings—Irons—With a Single Motor

The *only* complete home laundry unit. Detachable wringer. Ironer shaft attaches to wringer post. Saves cost of extra motor. Retail price, complete, $293.

The "Iron-All" attachment superbly irons the difficult operations that other ironers cannot handle — ruffles, collars, cuffs, children's dresses, etc.

A B C "Alco" Washer

Dolly type. Underneath drive. Single tub. Oversize motor. Machine-cut gears insure absolute quietness of operation. Also furnished for power drive off gasoline engine. Retail prices $65 to $100.

A B C "Twin Alco" Washer

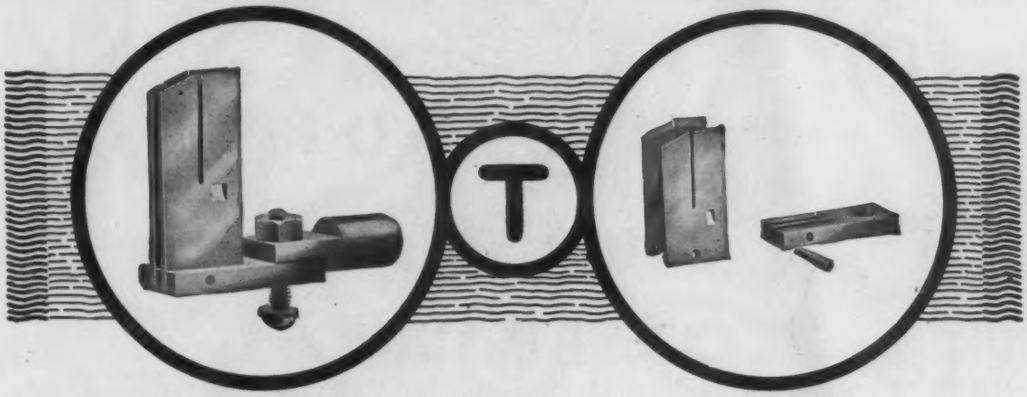
12-sheet capacity. Dolly type. Tubs can be operated singly or in unison. Oversize motor. Very quiet. Also furnished for power drive. Retail prices $90 to $125.

Altorfer Bros. Company

PEORIA, ILLINOIS NEW YORK CITY SAN FRANCISCO BRANTFORD, ONTARIO

Factories and Executive Offices, Peoria, Illinois

Safety Switches vs. Safety Boxes



Foot block milled. Blades sweated and pinned into foot block.

Machine made—not punched clip contact jaws.

800 amp.

A SAFETY BOX with a weak switch is like a big muscular body with a weak heart.

The switch must work unseen day after day and no opportunity is offered for observing defects as in an open switch.

"Circle T" Safety Switches are strong hearts — each switch being machine made and built up.

The contact jaws assure a positive contact each time the switch is closed thereby forestalling the danger of possible arcing and burning.

A complete line in stock
30 to 1200 amp., all types

If it's Circle-teed it's guaran-teed

The Trumbull Electric Mfg. Co.

595 Mission St., San Francisco, Cal.

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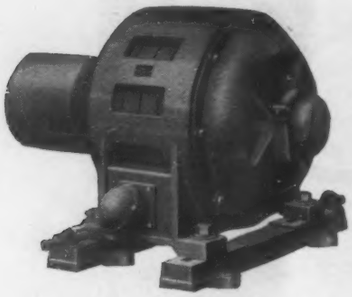
Branches in New York
Chicago, Boston, Philadelphia

Safety Switches

MOTORS

U. S. Motors have won wide approval by their performance

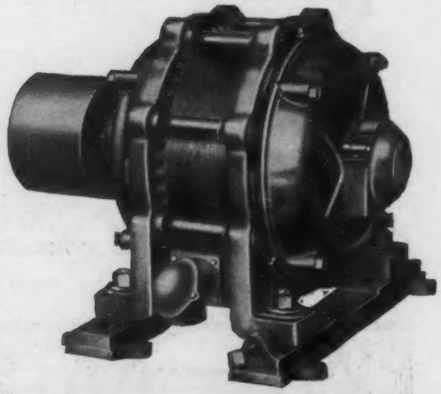


Built in the West to Meet Highest Western Standards

Tried and tested, not in a few, but in hundreds of industrial plants, shops and other places where electric power is used, U. S. Motors have lived up to the high standard of service promised by their manufacturers. Since 1906 U. S. have been relied upon. Today they represent the highest class product that money can buy. You should become fully acquainted with the "reasons why" U. S. Motors excel. Just drop us a line requesting literature.

Our Advisory Engineers are at Your Service

We maintain perhaps the most complete and competent corps of Electrical Engineers in Western America. No matter what your power requirements may be—whether you desire a ½ Horse Power Motor or a battery of special-built heavy duty types, our Engineers will assist you. Tell us your power needs.

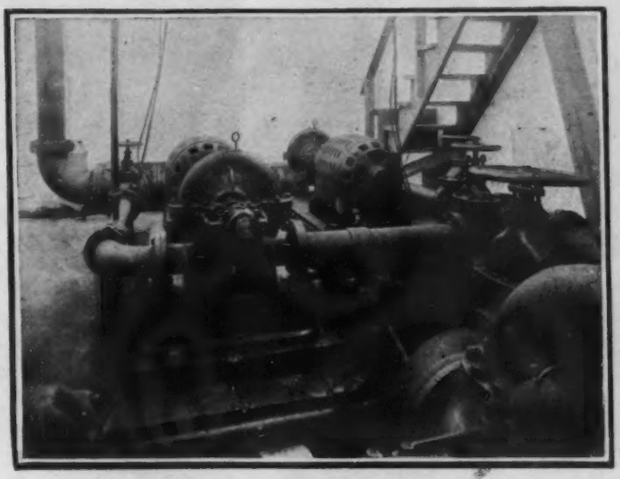


U. S. Electrical Mfg. Co.

General Offices and Plant

300 South Central Ave. Los Angeles, Calif.

Specify U. S. MOTORS



Fairbanks - Morse
Pumping Plants

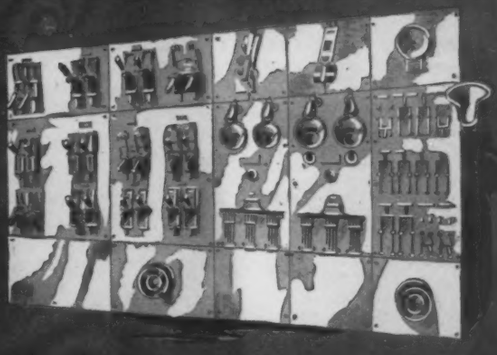
A Good Pump Plant on a Big Railroad

The pumping station at Galion, Ohio is a complete Fairbanks-Morse installation. Water is pumped from the river by a 10 in. Centrifugal pump direct connected to a 20 H. P. Type "B" Motor with "CC" Starter. From the reservoir the water is pumped to an elevated tank by two 4 in. Centrifugal pumps direct connected to a 25 H. P. type K. B. V. internal starter motor. These motors are automatically controlled by float switches in tank 1,000 ft. distant from the plant and magnetic switches with relay attachment at pump house throw the motors directly across the line without other starting equipment.

This installation is typical of many complete Fairbanks-Morse pumping installations in every industry all over the world giving uniform satisfaction. The complete job is backed by one responsibility.

Fairbanks, Morse & Co.
MANUFACTURERS CHICAGO
LOS ANGELES SAN FRANCISCO PORTLAND SEATTLE

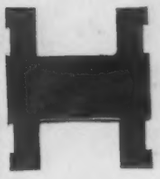
Oil Engines - Pumps - Electric Motors and Generators - Fairbanks Scales - Railway Appliances - Farm Power Machinery



VUL-COT FIBRE

Is always uniform in density, never contains fissures, grit, hard or soft spots.

And Here's Why



The American Vulcanized Fibre Company in its mill at Newark, Delaware, inspects, sorts, dusts, and cuts its own rags and makes its own paper. In another part of this big plant the paper, its thickness gauged to a thousandth of an inch, is made into tough, strong horn-like *VUL-COT* Fibre.

Care and close, constant supervision have been watch-words during the entire process and until it reaches you, in either sheets, rods or tubes or machined to your specifications. The latter is done in the company's Wilmington plant.

Here are just a few places in the electrical manufacturing field where you'll find it to your advantage to use *VUL-COT* Fibre:

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We'll send our book, The Material With A Million Uses. Tell us where.

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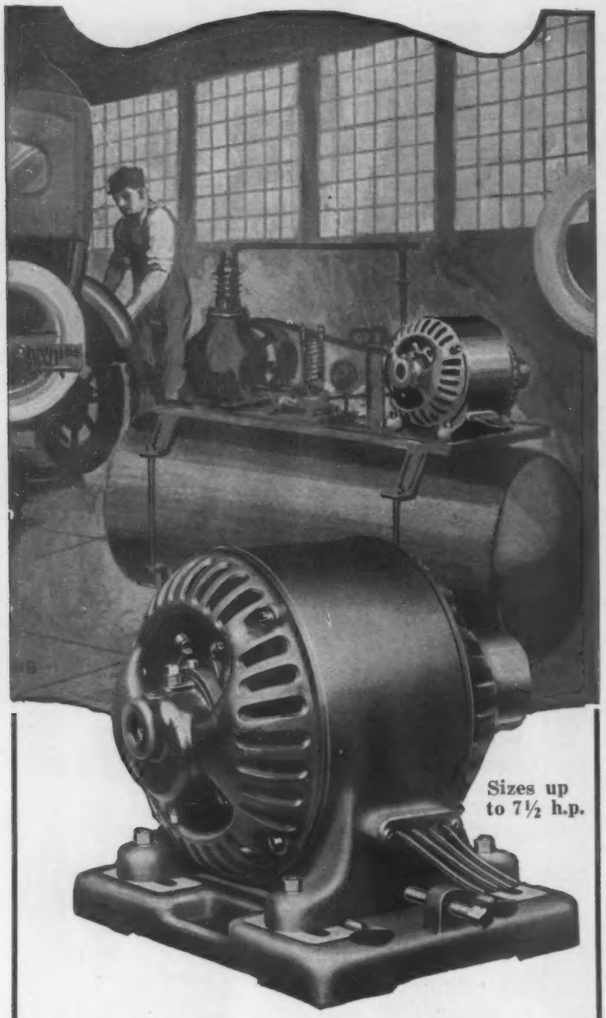

Sizes up to 7½ h.p.

A Strong, Sturdy Motor for Western Power Uses

Whether your power needs be for the garage, farm or factory, there is a Peerless Motor available in any capacity for the purpose.

The Type R single phase motor is in constant demand, due to its unusually strong characteristics and capacity to carry overload. Peerless A.C. motors are 40° rated.

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It has been said that one of the most vital organs of a meter is its permanent magnet — and its coordination with the other elements in a satisfactory manner determines the life of the instrument. Now, apropos to this, it will be interesting to meter engineers to know that a recent test on a number of Duncan Model M2 meters shipped six years ago over a routing of nearly five thousand miles, showed that all of the magnets, after being trudged over this long mileage, and in constant use all of this time maintained their strength throughout and failed to show any diminution whatsoever in their retentivity.

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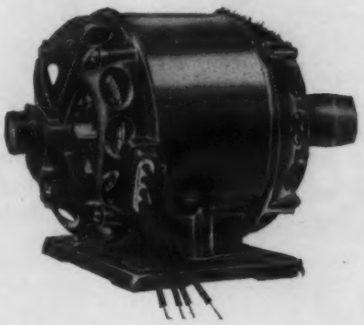

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(1/10 to 1/4 H. P.)

which possess a starting torque in excess of 3 times full load torque. They, therefore, are desirable for operating such apparatus as requires considerably more torque to start it than to keep it in motion, especially for such as is located in cool places and is controlled automatically or from a distance.

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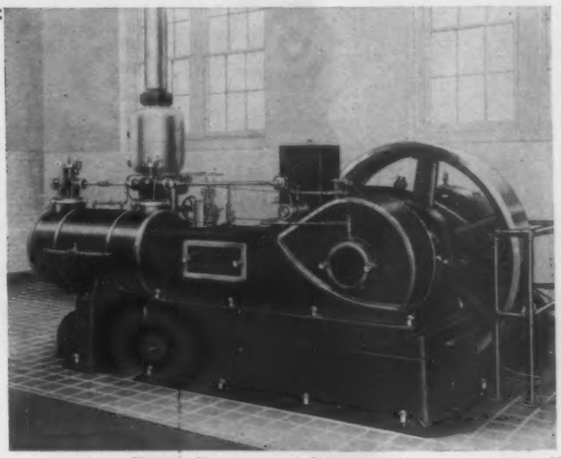
To every user of steam power in the west, economy of fuel is the ever present consideration and because of this, the lower steam consumption obtained through the Una-Flow principle in the Ames Engine is an object of greatest interest.

The Ames Una-Flow engine represents full development of every possible mechanical feature looking to high efficiency. These features, important as they are, are subordinate to the one great and outstanding accomplishment, namely the elimination of internal condensation and leakage. This improvement has placed these engines foremost in the field of steam prime movers.

Steam consumption per horsepower is practically the same at all loads, a highly important factor in the driving of generators.



Ames Engine direct connected to generator

The very definite need for steam plant equipment in western fields actuated the establishment of Pacific Coast offices in San Francisco, Portland and Los Angeles so that full and competent engineering service can be rendered in the installation of Ames equipment. Your specifications are respectfully solicited. Send for our latest bulletins.

Pacific Coast Office, Rialto Building, San Francisco—L. M. PAGE, Manager

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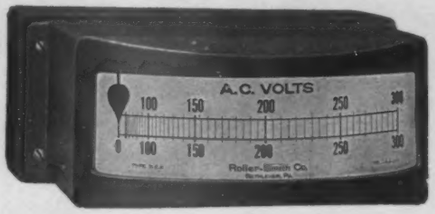
Factory Facilities ROLLER-SMITH Methods Do You Know

A Trade Talk on ROLLER SMITH Service

THE fact that ROLLER-SMITH Circuit Breakers, Instruments and Meters possess the reputation for highest quality that they today enjoy is due, not only to the fixed determination of the ROLLER-SMITH COMPANY to produce instruments, meters and protective devices of the highest possible quality, but to its careful and far-sighted provision for FACTORY FACILITIES of a character and scope that shall guarantee the realization of that purpose.



The ROLLER-SMITH COMPANY'S Factory was especially designed and constructed for the sole purpose of manufacturing ROLLER-SMITH products. Every thought of its planning and equipment—every bench, machine and "jig" in its outfitting—was planned and built and installed with the resolve to create a plant that when completed should stand as a model of its kind.

Upon these pillars rests the firm foundation of the tradition for quality in service built up by ROLLER-SMITH Circuit Breakers, Instruments and Meters in the electrical industry.

that the ROLLER-SMITH COMPANY is now prepared to supply the most complete line of switchboard type A.C. instruments on the market? Well, it is.

Sizes 3½", 4", 7½", 9" and Horizontal Edgewise; Ammeters, Milli-ammeters, Voltmeters, Milli-voltmeters, single and polyphase Wattmeters, Frequency Meters, Power Factor Meters, Synchronism Indicators, Ground Detectors. All ROLLER-SMITH Quality.

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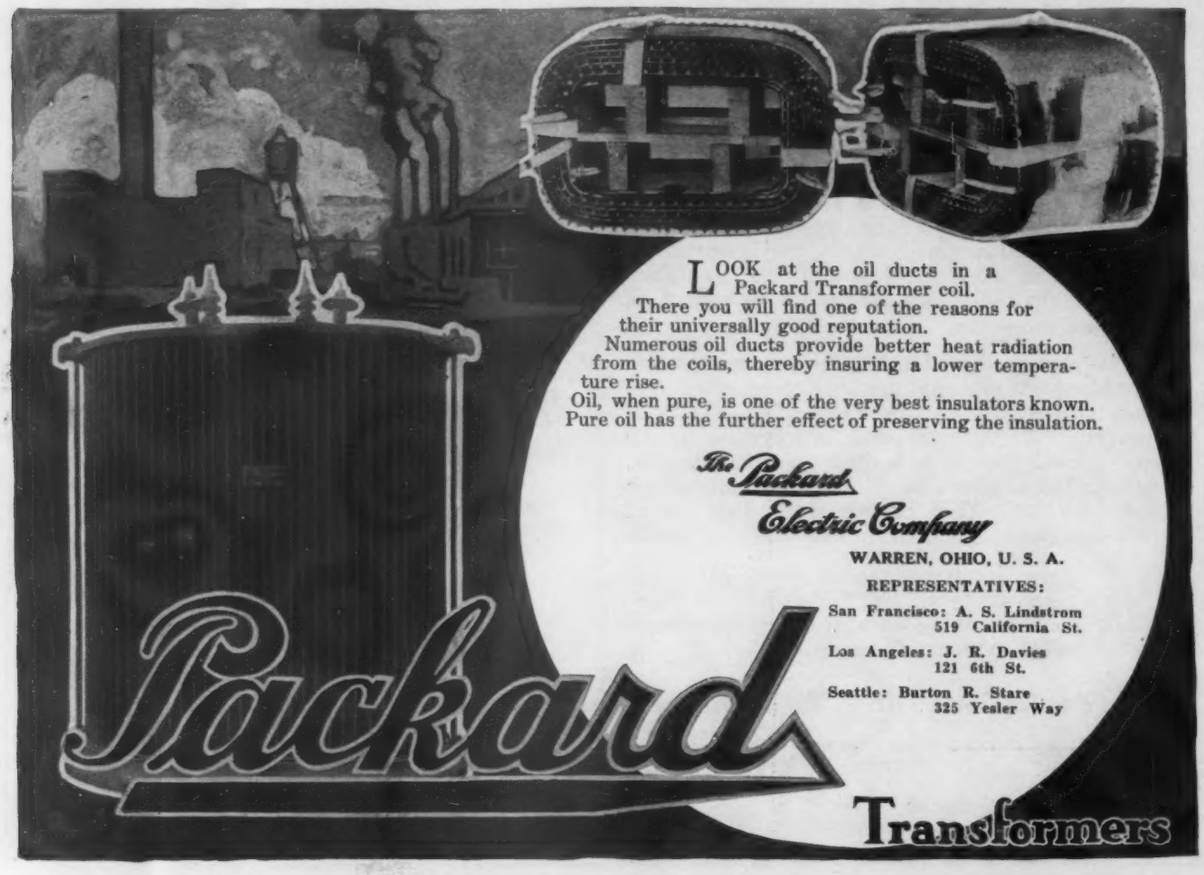
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There you will find one of the reasons for their universally good reputation.
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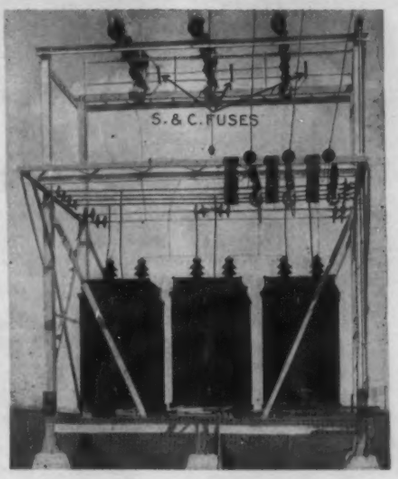

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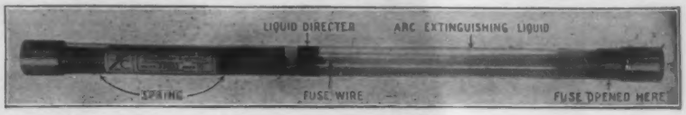
in high tension service clear the circuit in less than *one cycle* on short circuit. Because of this Extremely Rapid Action the circuit is broken before a fault in the transformer or other equipment can reach a "dead short circuit" condition.

The action of the fuse is very much faster than the ordinary oil circuit breaker, and the maintenance cost is usually less than the cost of renewing oil alone.



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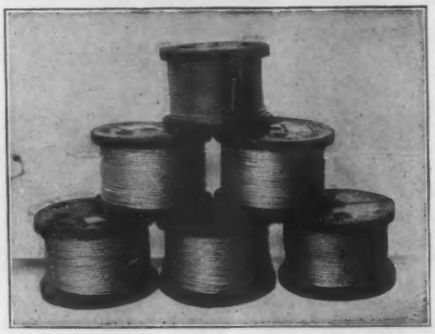

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Crouse-Hinds Company
General Electric Company

Heaters, Air Electric
Cutler-Hammer Mfg. Co.
General Electric Company

Heaters, Candy Electric
Cutler-Hammer Mfg. Co.

Heaters, Industrial Service
General Electric Company
Westinghouse Electric & Mfg. Co.

Heaters, Metal Electric
Cutler-Hammer Mfg. Co.
General Electric Company
Westinghouse Electric & Mfg. Co.

Heating Appliances, Including Irons, Stoves, Etc. (Electric)
Edison Electric Appliance Co.
Gute & Co., H. J.
Majestic Electric Development Co.
Pacific Mfg. & Electric Co.
Pacific States Electric Company
Simplex Electric Heating Co.
Western Electric Company
Westinghouse Electric & Mfg. Co.

Heating Pads, Electric
Wirt Company

Hoists, Electric
Fairbanks-Morse & Company
Moore & Company, Chas. C.
Sprague Electric Works
Western Electric Company
Wellman-Seaver-Morgan Co.

Hoods, Street
Benjamin Electric Mfg. Company
Pacific States Electric Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

House Lighting Outfits
Western Electric Company
Westinghouse Electric & Mfg. Co.

Instruments, Indicating
Electric Tester Company
Pacific States Electric Company
Roller-Smith Company
Sangamo Electric Co.
Westinghouse Electric & Mfg. Co.

Industrial Signals
Benjamin Electric Mfg. Co.

Instruments, Recording
Pacific States Electric Company
Roller-Smith Company

Instruments, Testing
Electric Tester Company
Pacific States Electric Company
Roller-Smith Company
Schweitzer & Conrad, Inc.
Western Electric Company

Insulators
Baker-Joslyn Company
General Electric Company
Johns-Manville, Inc.
Lapp Insulator Company, Inc.
Locke Insulator Mfg. Company
Pacific States Electric Company
Elec. Development & Machine Co.
The Ohio Brass Company
Thomas & Sons Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Insulators, High Tension
Baker-Joslyn Company
General Electric Company
Lapp Insulator Company, Inc.
Locke Insulator Mfg. Company
Pacific States Electric Company
The Ohio Brass Company
Thomas & Sons Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Insulating Material
American Vulcanized Fibre Co.
Baker-Joslyn Company
D & W Fuse Works of G. E. Co.
General Electric Company
Johns-Manville, Inc.
Pacific States Electric Company
Standard Underground Cable Co.
The Continental Fibre Company
Westinghouse Electric & Mfg. Co.

Insulation, Moulded
American Vulcanized Fibre Co.
Cutler-Hammer Mfg. Co.
The Continental Fibre Company
Johns-Manville, Inc.

Irons, Soldering
Cutler-Hammer Mfg. Co.
General Electric Company
Simplex Electric Heating Co.

Irons, Tailoring
Cutler-Hammer Mfg. Co.
Westinghouse Electric & Mfg. Co.

Lamp Standards
Pacific States Electric Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Lamps, Electric, Arc
Pacific States Electric Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Lamps, Incandescent
Edison Lamp Works
National Lamp Works
Western Electric Company
Westinghouse Lamp Company

Lamps, Miniature
Edison Lamp Works
National Lamp Works
Pacific States Electric Company
Western Electric Company
Westinghouse Lamp Company

Launch Lighting Outfits
Electric Storage Battery Co.

Lightning Arresters
General Electric Company
Westinghouse Electric & Mfg. Co.

Line Material, Pole
Baker-Joslyn Company
Hubbard & Company
Johns-Manville, Inc.
Locke Insulator Mfg. Company
Pacific States Electric Company
Thomas & Sons Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Line Material, Railway
Baker-Joslyn Company
General Electric Company
Johns-Manville, Inc.
The Ohio Brass Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

WHERE TO BUY

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Locknuts & Bushings
National Metal Molding Co.

Machinery, Mining
Allis-Chalmers Mfg. Company
General Electric Company

Magnets, Lifting
Cutler-Hammer Mfg. Co.
Electric Controller & Mfg. Co.

Marine Lighting & Signaling Apparatus
Benjamin Electric Mfg. Co.
General Electric Company

Meters, Ammeter & Volt
Duncan Electric Mfg. Co.
General Electric Company
Roller-Smith Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Meters, Watthour
Duncan Electric Mfg. Company
General Electric Company
Roller-Smith Company
Sangamo Electric Co.
Western Electric Company
Westinghouse Electric & Mfg. Co.

Meter Protective and Testing Devices
Johns-Manville, Inc.

Molding, Metal
National Metal Molding Company
Western Electric Company

Molding, Wood
Pacific States Electric Company
Western Electric Company

Motors, A.C.
Allis-Chalmers Mfg. Company
Century Electric Company
Crocker-Wheeler Company
Emerson Electric Mfg. Company
Fairbanks-Morse & Company
General Electric Company
Howell Electric Motors Company
Mechanical Appliance Co.
Robbins & Myers Company
Sprague Electric Works
U. S. Electrical Mfg. Co.
Wagner Electric Mfg. Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Motors, D.C.
Allis-Chalmers Mfg. Company
Crocker-Wheeler Company
Emerson Electric Mfg. Company
Fairbanks-Morse & Company
General Electric Company
Mechanical Appliance Co.
Robbins & Myers Company
Sprague Electric Works
U. S. Electrical Mfg. Co.
Wagner Electric Mfg. Company
Western Electric Company

Motor Generators
General Electric Company
Ridgway Dynamo & Engine Co.
Sprague Electric Works
Wagner Electric Mfg. Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Motor Starters, A.C. and D.C.
Crocker-Wheeler Company
Cutler-Hammer Mfg. Co.
General Electric Company
Electric Controller & Mfg. Co.
Trumbull Electric Mfg. Co.
Wagner Electric Mfg. Company
Western Electric Company
Ward Leonard Electric Company
Westinghouse Electric & Mfg. Co.

Motor Regulators
Wirt Company

Novelties, Electric
Western Electric Company

Oil Burners and Systems
Moore & Company, Chas. C.

Oil Fuse Cutouts, Aerial and Underground
D & W Fuse Works of G. E. Co.

Outlet Boxes and Covers
Chicago Fuse Mfg. Co.
National Metal Molding Co.

Ozonators
Pacific States Electric Company
Sprague Electric Works

Paint, Insulating
Baker-Joslyn Company
Johns-Manville, Inc.
Pacific States Electric Company
Westinghouse Electric & Mfg. Co.

Paints, Preservatives
Baker-Joslyn Company
Pacific States Electric Company

Panel Board Slate
Davis Slate & Mfg. Company
Westinghouse Electric & Mfg. Co.

Panel Boards
Benjamin Electric Mfg. Company
Crouse-Hinds Company
Pacific States Electric Company
Sprague Electric Works
Westinghouse Electric & Mfg. Co.

Panels, Motor Starting
Cutler-Hammer Mfg. Co.
General Electric Company
Pacific States Electric Company
Western Electric Company
Ward Leonard Company
Westinghouse Electric & Mfg. Co.

Pins, Eucalyptus and Locust
Baker-Joslyn Company
Locke Insulator Mfg. Company
Pacific States Electric Company
Western Electric Company

Pins, Iron and Steel
Baker-Joslyn Company
Hubbard & Company
Locke Insulator Mfg. Company
Pacific States Electric Company
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National Metal Molding Company
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M. W. Kellogg Company

Plates, Flush Switch
Pacific States Electric Company
Western Electric Company

Plugs, Attachment
Arrow Electric Company
Benjamin Electric Mfg. Company
Crouse-Hinds Company
Cutler-Hammer Mfg. Co.
Harvey Hubbell, Inc.
Pacific States Electric Company
Pass & Seymour
Richards & Co., Geo.
Western Electric Company

Pole Line Hardware
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Poles, Iron and Steel
Baker-Joslyn Company
Bates Expanded Steel Truss Co.
Pacific Coast Steel Co.
Pacific States Electric Company
Western Electric Company

Pole, Wood
Baker-Joslyn Company
Pacific States Electric Company
Western Electric Company

Porcelain Specialties
Locke Insulator Mfg. Company
Thomas & Sons Company

Portables, Electric
Pacific States Electric Company
Western Electric Company

Potheads
Elec. Development & Machine Co.
Johns-Manville, Inc.
Standard Underground Cable Co.

Power Plants
Allis-Chalmers Mfg. Company
General Electric Company
Moore & Company, Chas. C.
Western Electric Company
Westinghouse Electric & Mfg. Co.

Power Plant Piping
Moore & Company, Chas. C.

Projectors, Electric
Crouse-Hinds Company
General Electric Company
National X-Ray Reflector Co.
Western Electric Company

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General Electric Company
Elec. Development & Machine Co.
Johns-Manville, Inc.
Westinghouse Electric & Mfg. Co.

Pumps, Condenser
Westinghouse Electric & Mfg. Co.

Pumps, Centrifugal
Fairbanks-Morse & Company
Moore & Company, Chas. C.
Pelton Water Wheel Company
Westinghouse Electric & Mfg. Co.

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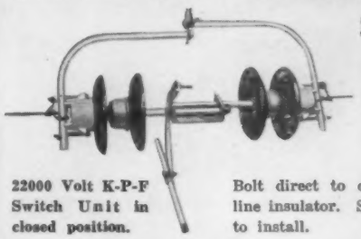

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Bolt direct to cross arm in place of line insulator. Shipped complete, ready to install.

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THE aim of the advertising department is to cooperate, in any way possible with advertisers, to the end that the best results may be obtained from the use of space in the Journal.

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Western Electric Company
Westinghouse Electric & Mfg. Co.

Rail Bonds
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The Ohio Brass Company
Westinghouse Electric & Mfg. Co.

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Pacific States Electric Company
Simplex Electric Heating Co.
Western Electric Company
Westinghouse Electric & Mfg. Co.

Rectifiers
General Electric Company
Pacific States Electric Company
Wagner Electric Mfg. Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Reflectors
Benjamin Electric Mfg. Company
Harvey Hubbell, Inc.
Duplex Lighting Works
Ivanhoe Regent Works
National X-Ray Reflector Co.
Pacific States Electric Company
Western Electric Company

Regulators, Boiler Feed
Moore & Company, Chas. C.

Regulators, Voltage
General Electric Company
Western Electric Company
Ward Leonard Electric Company
Westinghouse Electric & Mfg. Co.

Reinforcing Bars
Pacific Coast Steel Co.

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Elec. Development & Machine Co.
General Electric Company
Roller-Smith Company

Resistance Units
Cutler-Hammer Mfg. Co.
General Electric Company
Ward Leonard Electric Company
Western Electric Company
Westinghouse Electric & Mfg. Co.
Wirt Company

Resistances
Cutler-Hammer Mfg. Co.
Electric Controller & Mfg. Co.
General Electric Company
Ward Leonard Electric Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Rheostats
Cutler-Hammer Mfg. Co.
General Electric Company
Pacific States Electric Company
Ward Leonard Electric Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Rods, Copper, Brass, Bronze
Standard Underground Cable Co.

Rosettes
Arrow Electric Company
Crouse-Hinds Company
General Electric Company
Pacific States Electric Company
Pass & Seymour

Searchlights
General Electric Company
Pacific States Electric Company
Western Electric Company

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Benjamin Electric Mfg. Company
Faries Manufacturing Company
Harvey Hubbell, Inc.
Duplex Lighting Works
National X-Ray Reflector Co.
Western Electric Company

Shade Holders
Arrow Electric Company

Slate
Davis Slate & Mfg. Co.
Westinghouse Electric & Mfg. Co.

Sockets and Receptacles
Arrow Electric Company
Benjamin Electric Mfg. Company
Bryant Electric Co., The
Cutler-Hammer Mfg. Co.
Harvey Hubbell, Inc.
Crouse-Hinds Company
National X-Ray Reflector Co.
Pacific States Electric Company
Pass & Seymour
V.V. Fittings Company
Western Electric Company

Solder, Self-fluxing, Solid Wire and Bar
Baker-Joslyn Company
Pacific States Electric Company
Western Electric Company

Soldering Paste, Compounds and Salts
Baker-Joslyn Company
Westinghouse Electric & Mfg. Co.

Solenoids
Electric Controller & Mfg. Co.

Staples, Insulating
Pacific States Electric Company
Western Electric Company

Starters, D.C. and A.C.
Cutler-Hammer Mfg. Co.
Electric Controller & Mfg. Co.
General Electric Company
Pacific States Electric Company
Wagner Electric Mfg. Company
Ward Leonard Electric Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Steel, Structural
Pacific Coast Steel Co.

Strand (Galvanized)
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Pacific States Electric Company
Western Electric Company

Street Lighting
General Electric Company

Sub-stations, Outdoor
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Supplies, Electrical
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General Electric Company
Pacific States Electric Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

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(See Boxes)

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Keeler White Company
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Cutler-Hammer Mfg. Company
Electric Controller & Mfg. Co.
General Electric Company
Pacific States Electric Company
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Switches, Disconnecting
Elec. Development & Machine Co.
Electrical Engineers Equip. Co.
General Electric Company
Pacific States Electric Company
Schweitzer & Conrad, Inc.
Westinghouse Electric & Mfg. Co.

Switches, High Tension
Electrical Engineers Equip. Co.
General Electric Company
Pacific States Electric Company
Schweitzer & Conrad, Inc.
Westinghouse Electric & Mfg. Co.

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Baker-Joslyn Company
Crouse-Hinds Company
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Pacific States Electric Company
Trumbull Electric Mfg. Co.

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Allis-Chalmers Mfg. Company
Crocker-Wheeler Company
General Electric Company
Pacific States Electric Company
Westinghouse Electric & Mfg. Co.

Switches, Pendant
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Cutler-Hammer Mfg. Co.
Pacific States Electric Company
Western Electric Company

Switches, Pole Top
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Switches, Push Button
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Cutler-Hammer Mfg. Co.
Pacific States Electric Company
Western Electric Company

Switches, Safety
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Westinghouse Electric & Mfg. Co.

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Electric Storage Battery Company
General Electric Company
Pacific States Electric Company
Trumbull Electric Mfg. Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Switchboards, Telephone
Western Electric Company

Tanks, Iron and Steel
Ames Iron Works

Tape
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General Electric Company
Johns-Manville, Inc.
New York Insulated Wire Co.
Pacific States Electric Company
Western Electric Company

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Pacific States Electric Company
Western Electric Company

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Standard Underground Cable Co.
Wagner Electric Mfg. Company

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Tools, Construction
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Hubbard & Company
Mathias Klein & Sons
Pacific States Electric Company
Western Electric Company

Towers, Steel
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Pacific Coast Steel Co.
Pacific States Electric Company

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Allis-Chalmers Mfg. Company
Crocker-Wheeler Company
Duncan Electric Mfg. Company
General Electric Company
Kuhlman Electric Company
Pacific States Electric Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Trolley Line Material
J. G. Brill Company
General Electric Company
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Pacific States Electric Company
The Ohio Brass Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Tubes, Copper and Brass
Standard Underground Cable Co.

Tubing, Flexible
National Metal Molding Company

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General Electric Company
Ridgway Dynamo & Engine Co.
Westinghouse Electric & Mfg. Co.

Turbines, Hydraulic
Allis-Chalmers Mfg. Company
Pelton Water Wheel Company
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Wellman-Seaver-Morgan Co.

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Electric Vacuum Cleaner Co., Inc.
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Westinghouse Electric & Mfg. Co.

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Hurley Machine Company
Pacific States Electric Company
Western Electric Company

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Edison Electric Appliance Co.
Pacific Mfg. & Electric Company
Pacific States Electric Company
Simplex Wire & Cable Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

Water Wheels
S. Morgan Smith
Pelton Water Wheel Company
Wellman-Seaver-Morgan Co.

Welding, Electric
General Electric Company
The Ohio Brass Co.

Welder, Portable Electric
The Ohio Brass Co.

Welder, Rail Joint
The Ohio Brass Co.

Wire, Aluminum
Pacific States Electric Company
Western Electric Company

Wire, Annunciator and Office
Pacific States Electric Company
Phillips Wire Company
Rome Wire Company
Safety Insulated Wire & Cable Co.
Standard Underground Cable Co.
Western Electric Company

Wire, Armored
Baker-Joslyn Company
Habirshaw Electric Cable Co., Inc.
National Metal Molding Co.
Pacific States Electric Company
Safety Insulated Wire & Cable Co.
Sprague Electric Works
Standard Underground Cable Co.
Western Electric Company

Wire, Asbestos Covered
Baker-Joslyn Company
Johns-Manville, Inc.
Pacific States Electric Company
Western Electric Company

Wire, Bare Copper
Anaconda Copper Mining Co.
Baker-Joslyn Company
Pacific States Electric Company
Phillips Wire Company
Roebling's Sons Co.
Rome Wire Company
Standard Underground Cable Co.
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D & W Fuse Works of G. E. Co.
Simplex Wire & Cable Co.

Wire, Enameled
Pacific States Electric Company
Rome Wire Company
Western Electric Company

Wire, Galvanized and Strand
Baker-Joslyn Company
Pacific States Electric Company
Western Electric Company

Wire, Magnet
Baker-Joslyn Company
Pacific States Electric Company
Rome Wire Company
Safety Insulated Wire & Cable Co.
Standard Underground Cable Co.
Western Electric Company

Wire, Rubber Covered
Baker-Joslyn Company
General Electric Company
Habirshaw Electric Cable Co., Inc.
Indiana Rubber & Insul. Wire Co.
National Metal Molding Co.
New York Insulated Wire Co.
Pacific States Electric Company
Phillips Wire Company
Reiman Wholesale Elec. Co.
Roebling's Sons Co.
Rome Wire Company
Safety Insulated Wire & Cable Co.
Simplex Wire & Cable Co.
Standard Underground Cable Co.
U. S. Rubber Company
Western Electric Company

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Simplex Wire & Cable Co.

Wire, Weatherproof
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General Electric Company
Indiana Rubber & Insul. Wire Co.
New York Insulated Wire Co.
Pacific States Electric Company
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2105

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are best for
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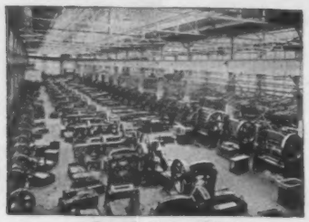
One Bay of Iron Foundry

Section of Assembly Building



Punch Press Dept.

Testing Dept. Power Substation

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In-built strength and accurate design, resulting in commendable performance, have given G-E Transformers their acknowledged supremacy.

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33A-53

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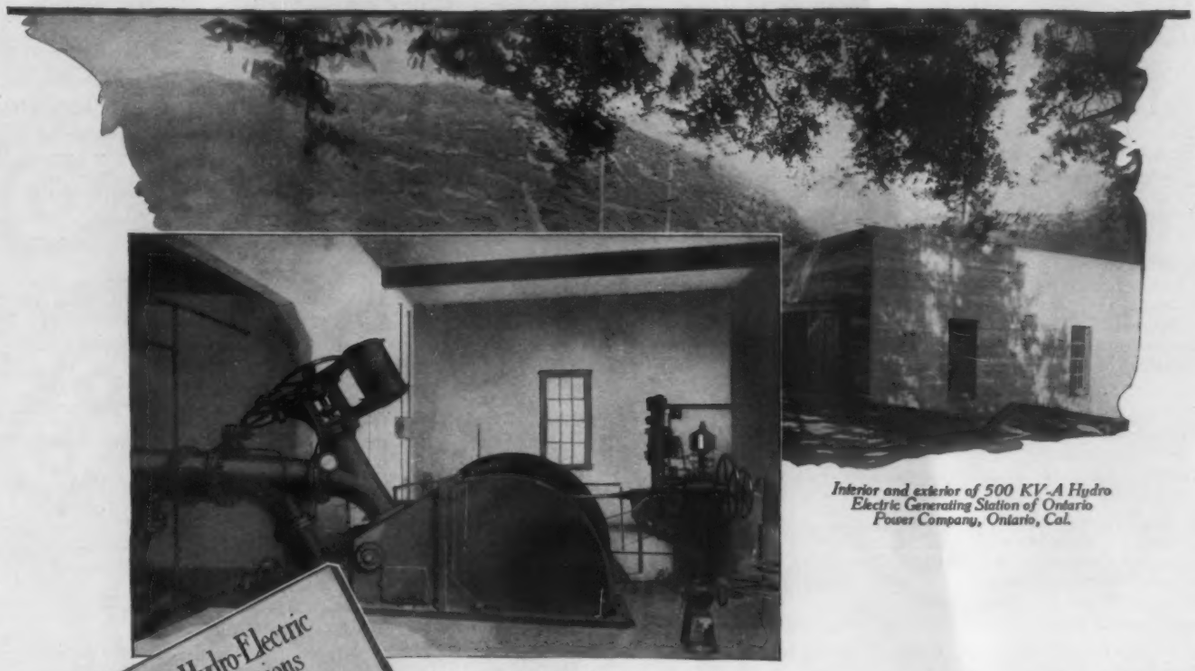

Interior and exterior of 500 KV-A Hydro Electric Generating Station of Ontario Power Company, Ontario, Cal.

This bulletin 40604 on Automatic Hydro-electric Generating Stations awaits the call of every man interested. Send for it.

Making Every Stream Work

DUE to the advent of General Electric Automatic Hydro-Electric Stations, many power sites have been developed that would have been uneconomical for manually controlled stations. The automatic control features eliminate the expense of skilled operators and station attendants.

G-E Automatic Control is available to make small plants automatically feed into a large system or to operate them as independent sources of power.

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Rocky Mountain Offices in: Denver, Colorado; Salt Lake City, Utah

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